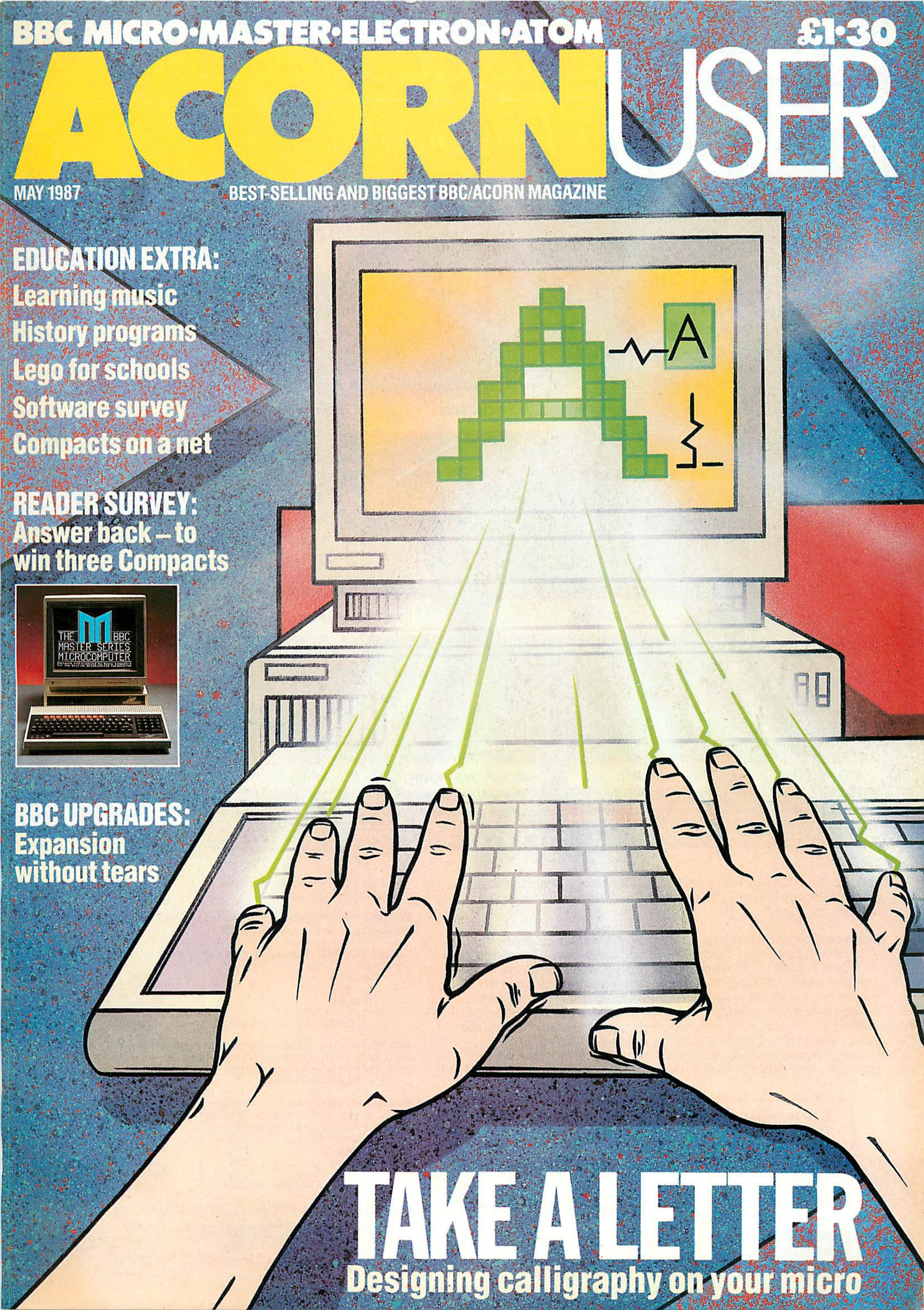


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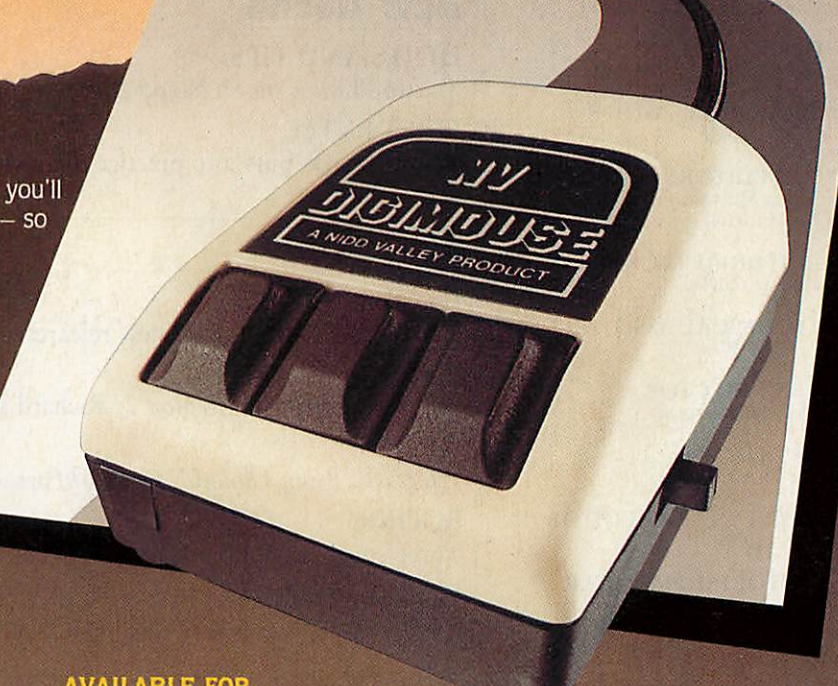
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# ACORN USER

ISSUE No 58 MAY 1987



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## REVIEWS



## EDUCATION

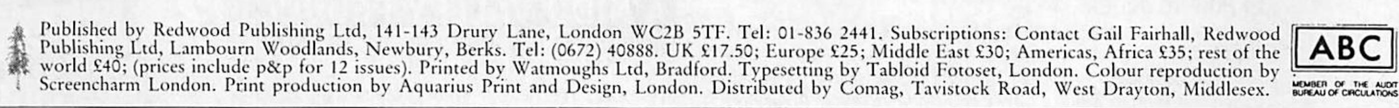


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## EDUCATION – SPECIAL ISSUE





News, reviews, programs networks – our annual roundup for schools and colleges

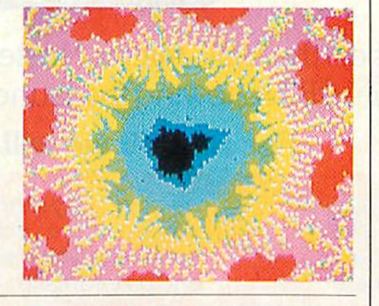
## FEATURES





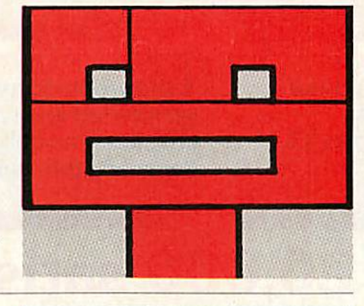
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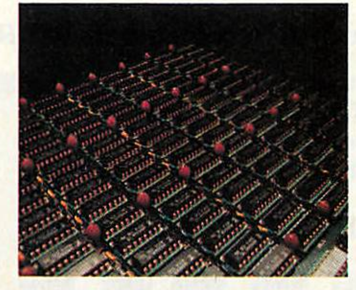
David Johnson-Davies explores the wild patterns submitted in response to last year's mathematical Mandelbrots





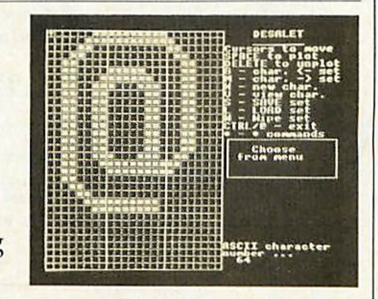
Joe Telford has designed a program for visual accompaniment to easily entered musical chimings





Manek Dubash on making various add-on boards fit inside the micro, and ensuring their software doesn't clash






Design your own sets of large characters for producing eye-catching notices and posters on a home printer

## COVER




Illustration by Matthew Bell

## NEXT MONTH

Home Publishing special issue: the editor's chair, publishing software, writing a book with *View*. Also the RISC chip, MS-DOS, Mijas System, loads of games

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## DISC DRIVES

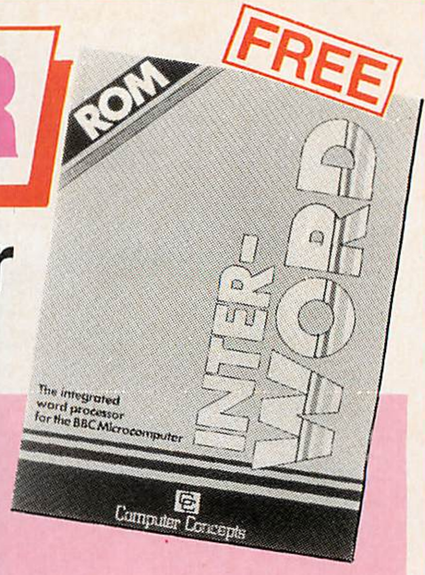
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### OTHER HARDWARE

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| 0662E | 25x 40T DS DD Discs | 26.47 | 25.15 |
| 0663E | 25x 80T SS DD Discs | 26.47 | 25.15 |
| 0664E | 25x 80T DS DD Discs | 29.00 | 27.55 |
| 0665E | 50x 40T SS DD Discs | 48.00 | 45.60 |
| 0666E | 50x 40T DS DD Discs | 50.00 | 47.50 |
| 0667E | 50x 80T SS DD Discs | 50.00 | 47.50 |
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### BEEBUG HARDWARE

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# NEWS

## Superior seeks games gurus

Superior has revealed the secrets of software writing in a handbook to be distributed to would-be authors, written by its managing director Richard Hanson.

The company has launched a major recruitment drive, inviting potential authors to send in details of ideas. Last year's campaign got 2,500 replies. Everyone who writes in will receive the handbook, which covers areas like copyright, publishers and payments.

## Free language

Mathematically minded programmers will be pleased that the APL language is to be available for the BBC micro – free.

APL (A Programming Language) is widely used on minicomputers for maths work.

A group, I-APL, is producing an APL interpreter for home micros, and will distribute it free, although the group will accept donations.

Contact I-APL at 2 Blenheim Road, St Albans, AL1 4NR.

## Repeated Master fire warnings

If you own a Master bought before June 1, 1986, look inside at the battery pack. Acorn has repeated its warning that Masters should now be fitted with alkaline batteries, in the form of three cells strapped to a metal carrier and mounted next to the mains power supply. If you have a small lithium battery in the plastic moulding which houses the speaker get it changed – there's a fire risk. Ring Acorn on (0223) 214411 to find out how to do this, or contact your dealer.

# Breakthrough in printed graphics

AB Designs has launched a graphics system to put the BBC micro in direct competition with computers like the Apple Macintosh for producing black and white or colour artwork.

The £200 *Microbrush* gives the Master 128 the ability to squeeze the resolution of several mode 0 screens into one A4 page – an astounding 1216 by 2000 pixels.

And as well as the high resolution, the package gives virtually unlimited control over the quality of the printed image on a dot matrix or Integrex colour printer.

*Microbrush A* is compatible with both the BBC B and Master. It comes on two chips with extra utilities on disc.

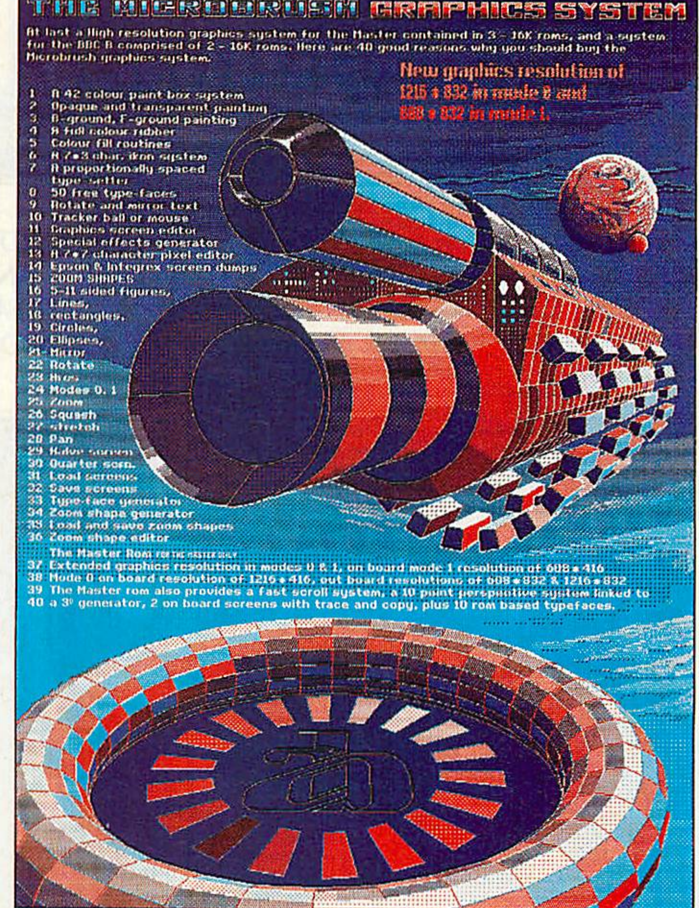
The most impressive feature is the resolution – up to 1216 x 416 in mode 0, and 608 x 416 in mode 1. In addition, the screen can be used as a window on the design, giving an effective resolution of 1216 x 832.

Either mode gives a palette of 42 colours or grey tones, and more can be created.

Text is entered from a special menu, pulling letters down and




Camera shows mode 0 resolution




Complete A4 page dumped on an Integrex printer

placing them in similar fashion to rub-down lettering. The disc contains 50 proportional typefaces plus utilities to design your own.

An icon editor is provided and up to 46 can be stored in memory.

A wide range of drawing routines is provided by one of the chips. These include circles, mirror images, rotation, zooming, squashing, and copying, plus 3D effects and a pixel editor. There are also outlines, shadows, half-tone dots and other special effects.

A Master version, *Microbrush B*, uses an extra chip almost to quadruple the resolution with other extras like 10 text typefaces on chip and a 3D generator system.

The software is designed to work with the Marconi RB2 trackerball, but can also use AMX and Wigmore mice. *Microbrush A* is £150, whilst *Microbrush B* is on three chips and costs £200.

# Masterpieces...

**NUCLEUS 20**

**HD2000**

**HARD DISC AND STREAMER PRODUCTS**

**STREAMER 10**

**UFD2000**

At Akhter we believe in freedom of choice which is why we have many combinations of disk and streamer products available for you. All these products are designed and manufactured in the U.K. and conform to the highest UK industry standards. With products ranging from stand alone 20 Mbyte Hard disk drives through to complete subsystems comprising of 20 Mbyte hard disk with 10 Mbyte Streamer and 1 Mbyte floppy disk we feel we can meet even the most stringent of applications.

| MODEL | DESCRIPTION | PRICE |
|---|---|---|
| HD1000 | 10MB HARD DISK WITH POWER SUPPLY | £599.95 |
| HD2000 | 20MB HARD DISK WITH POWER SUPPLY | £699.95 |
| HD4000 | 40MB HARD DISK WITH POWER SUPPLY | £1995.95 |
| HD1085 | 85MB HARD DISK WITH POWER SUPPLY | £1899.00 |
| HD1140 | 140MB HARD DISK WITH POWER SUPPLY | £2995.00 |
| STREAMER 10 | 10MB TAPE STREAMER WITH PSU | £749.95 |
| ARCHIVE | 10MB STREAMER+1MB FLOPPY WITH PSU† | £949.95 |
| NUCLEUS 20 | 20MB+10MB STREAMER+1MB FLOPPY† | £1599.95 |
| NUCLEUS 40 | 40MB+10MB STREAMER+1MB FLOPPY† | £1995.95 |
| UFD 2000 | 20MB+1MB FLOPPY† | £1995.95 |
| HFD 2000 | 20MB+10MB STREAMER† | £1495.95 |

†These units are mounted in a plynth suitable for the Acorn Master 128 Series and includes Power supply units.

All prices include V.A.T.







**AKHTER GROUP PLC.**
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TEL: HARLOW (0279) 443521
TELEX: 818894 AKHTER G

## The Comms Column

Graham Clayton, editor of the BBC Ceefax service, confirmed rumours of a Ceefax link with the very successful French version of the Prestel viewdata service, Minitel. The revelations came when he was recently interviewed on Micronet's Celebrity Chatline. In spite of rumours, however, it appears unlikely that real-time coverage of Ceefax pages will be available on Prestel.

Miracle Technology has no plans to adjust the prices of its WS3000 range of modems, following Pace's dramatic price reductions last month. Miracle's top-of-the-range model, clocking speeds of up to 2400 baud full duplex, is still on sale at £650, compared with the Pace series IV at £499.

Modem manufacturer Case has brought the cost of its 2400/2400 baud 400/22B modem down to £495 from £625. Tandata has also reduced the prices on some of its hardware, including the 1200 baud full duplex Tm602 model, now at £399. Recent price drops on the faster modems will almost certainly encourage serious users to upgrade and make long-term savings on phone costs with faster data transfer rates. Many online services, including Prestel, are now adopting these high speeds.

Modem House (Sci-Tek) has ceased trading and has gone into liquidation, with several significant debts. It remains to be seen whether the company's internal modem for the Master will see the light of day.

Kirk Automation, famous for manufacturing the Voyagers, Magic, and Apollo modems, will now be concentrating on the design of more advanced modems and electronics. It will still be marketing the Enterprise 1 and 2, offering V21/23 and V22 respectively. In future, the company will use the name Anglo Computers. *Buzz*

# Observer goes on-line

*By Steve Mansfield*

Prestel has finally teamed up with the *Observer* to provide a daily news service online, as forecast by *Acorn User* in September 1986.

The news will be supplied by the *Observer's* usual team of reporters and correspondents daily. The pages on Prestel will be constantly updated between 8am and 6pm on weekdays and during Saturday mornings.

### Business

The service is aimed mainly at companies who need to stay in touch with what's happening during the day. For the most part they'll be members of the various business groups on Prestel – Farmlink, Citiservice and the Travel group – and so the news will be suitably serious, with the emphasis on economic and political developments.

As well as covering the main headline stories, the service will include detailed analysis of worldwide news plus a summary of what the daily newspapers are saying. The pages will also cover the entertainment world, with news and reviews of TV programmes, films and theatre productions.



Serious news on Prestel

Unlike most information providers on Prestel, who pay for the privilege of supplying the information, the *Observer* is charging Prestel, although both parties are reluctant to release any figures on the deal.

You can find the service from Prestel's Focus menu, or by going directly to page 3456.

Prestel has become the first user of British Telecom's new high speed data network.

According to BT, the system provides error-free data transmission at rates of up to 2400 baud – twice as fast as the existing system. Also new are the error-correcting protocols which BT has added for people using the high speeds.

The system should have been in operation some months ago, but according to BT it was delayed by the recent strike. Details of the new system and what it means for subscribers will be included in the next issue of the Prestel directory.

# Chip chop-chop

*By William Gallaher*

A new interactive video package from Acorn will be driven by a custom chip thanks to Steve Lowry, technical consultant to the BBC Computer Literacy Project and director with BBC2's 'Micro Live'.

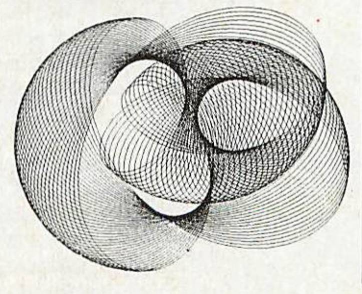
Texas Instruments contacted him with the idea of filming their new chip design and manufacture processes late last year, and Lowry himself thought of filming the whole process involved in making one specific chip.

TI's new method of making custom chips by using an electron beam with an accuracy of some ten millionths of an inch to mark the areas on the processed silicon, and then chemically deposit the design, means that a custom chip can take weeks rather than months to go from design to production.

# Double 0 heaven!

Design Dynamics has produced a program to improve the quality of mode 0 dumps. Although mode 0 gives horizontal resolution of 640 pixels, the vertical resolution is only 256.

The *Mode-00* program doubles the vertical resolution allowing print-outs like this.



# Bank pack for ducks and trucks

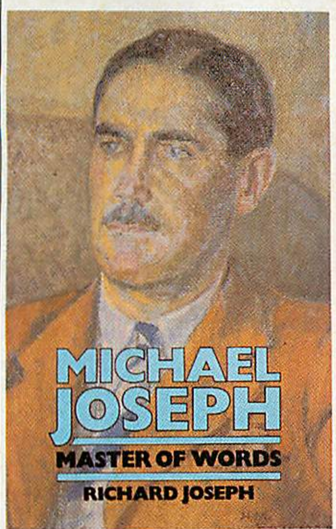
Four case studies on running small businesses – a florist, a duckling farm, a haulage company and a crystal engraver – are at the heart of a major pack for schools from the Banking Information Service (BIS).

*BIS-ness* is the name of the pack and, at £39.95 including VAT, it includes a pupils' disc and booklet simulating each of the companies, a book of teachers' notes and a VHS video. The film presents an 'over the top' image of business giving clues to the sort of traits that can bring a struggling company down.

The teachers' notes cover discussion topics and point out the importance of decisions.

A follow-up is planned for May on information technology. Contact the Banking Information Service, 10 Lombard St, London EC3V 9AT.

## Next month in AU




The June issue of *Acorn User* is a home publishing special. Richard Joseph will explain how he used *View* to write and typeset a book about his father, the publisher Michael Joseph. There will be wordprocessing tips, and Clive Williamson will examine authors' aids. Our own Tony Quinn will be revealing how to be an editor.

## News in brief

- A new computer show is to be launched in Manchester later this year. Computer North, organised by Cahners, is aimed at business micro users and will be held at the G-MEX Centre from May 27 to 29.
- Sentinel Electronics has come up with a simple and inexpensive introduction to interfacing. The Magic Eye is a light-dependent resistor which comes with a suitable plug for BBC micros, a lead allowing you to drive a motor with the cassette relay and software.

  The idea is that the kit forms the basis for the user's own experiments. It costs £12.99.
- The Northwest Computer Club (NCC) is looking to arrange exchange visits and joint outings with other computer clubs.

  The NCC is made up mainly of BBC micro owners and is based in Runcorn. It can be contacted on (09285) 60655.

# 'Sidekick' for Beeb

PMS has come up with the answer for people who need to make notes or look up a phone number in the middle of doing something else.

A new package, *Genie*, gives you a notepad, with word wrap and other wordprocessor features, a desk diary, a calendar, phone book, address book and calculator which are accessible no matter what you're doing with the micro.

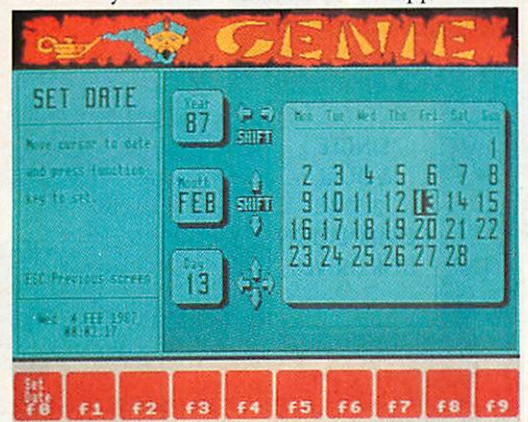
After you've finished with the utilities, *Genie* restores the previous activity.

Although it uses an 80-column screen, there are up to seven colours on screen. These are user-selectable.

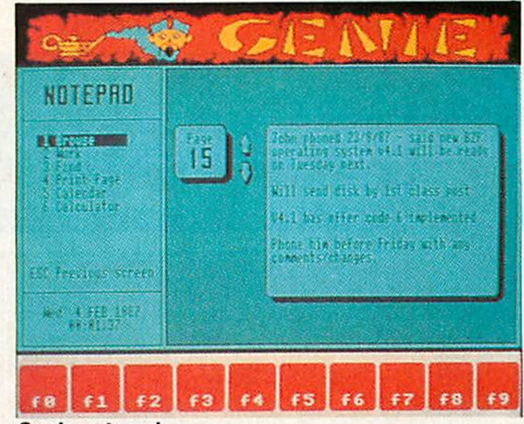
The package is similar to 'pop-up' utilities like *Sidekick* found on 16-bit business micros. They are usually held in memory, but the BBC micro has little to spare, so *Genie* comes with its own. Although it appears to the micro to be an ordinary 16k chip, the *Genie* card actually holds 32k of program and 64k of dedicated RAM for the data.

This is all mounted on a three-inch square card, connected to a standard ROM socket through a ribbon cable. There is nothing to solder or modify. By using a ribbon cable, PMS hopes to avoid clashes with other boards.

The price of the package is £79.35, including VAT.




***Genie* calendar**




***Genie* notepad**

# Olivetti's Compact ACE

Clares Micro Supplies has announced another deal with Olivetti to supply software for the Compact in Italy, involving a drawing package for the Master series machines recently launched here.

The new product is *ACE*, or *Artroom Colour Extension*. This is being supplied to Olivetti along with the existing *Fontwise+* and *Font Editor*.

*ACE* is a set of utilities, the main one for converting *Artroom* screens to mode 1. It also allows colour to be used and for the Compact's built-in graphics patterns to be added and edited.

The software will also convert any saved graphics screen, including those in mode 7, into a mode 4 *Artroom* screen. The package comes with a library of pictures, maps and other useful graphics screens.

The UK price for *ACE* is £15 on 5.25-inch disc for the Master 128, or £17 on 3.5-inch disc for the Compact.

## Spell Master out – almost

Computer Concepts' spelling checker on a chip, *Spell Master*, has finally been launched, but it may be some time before most people can get hold of it.

The problem is a lack of chips. The company is facing delays of at least a month.

Meanwhile, the last part of the *Inter* suite of programs, *InterBase*, is nearing completion. The main software is complete and waiting to be packaged into a 64k ROM. However, the software is a type of database language, and Computer Concepts wants to launch it with applications. It will be launched when these are ready, around mid-May.

## Board robot

Edutech, a company run by the pupils of Oundle school in Peterborough, has produced a robot controller board. This provides eight motor outputs, eight inputs, four analogue inputs and two Schmitt triggers. It is designed to be used especially with model construction kits and such like. The price of the unit is £99.

# Master Series...

MD802G

SINGLE & DUAL 3.5" & COMBINATION DISK DRIVES

MD400F

COMBO E

COMPACT 5¼

At Akhter we listen to our customers and observe market changes. Such observations have led us to design and manufacture both 3½" and 3½" + 5¼" customised configurations with our proven ability in quality assurance we are able to offer these specialist products at standard pricing. Versatility, variety and value for money makes Akhter first choice for add-on disk drives for the BBC & Master Series Acorn computers.

| MODEL | DESCRIPTION | PRICE |
|---|---|---|
| MD400F | 400K 3½" dual case | £125.95 |
| MD400G | 400K 3½" dual case + P.S.U. | £139.95 |
| MD802F | Dual 400K 3½" Floppy | £219.95 |
| MD802G | Dual 400K 3½" Floppy+P.S.U. | £239.95 |
| COMBO C | 3½+5¼ Floppy in Dual Format | |
| COMBO E | 3½+5¼ Floppy in Dual Format+P.S.U. | |
| COMPACT 5¼ SINGLE | Master Compact with internally fitted single 5¼ floppy. † | £499.95 |
| COMPACT 5¼ DUAL | Master Compact with internally fitted dual 5¼ floppy. † | £639.95 |
| †No monitor supplied. | | |

All prices include V.A.T.

USER FRIENDLY




AKHTER GROUP PLC.
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# Teacher links

Two new educational bulletin boards are now on line.

The first is part of *The Times* Network Systems database, run on Telecom Gold. It's aimed at teachers who want to exchange ideas on the new GCSE exams.

It is being run in conjunction with the Southern Examining Board. The aim is to speed up curriculum development.

The other board is run by the Deramore High School in Belfast. There are over 1000 pages, mainly of interest to teachers, but also with general information and software.

It runs at 1200/75 baud on (0232) 641514, 24 hours a day.

# Fast 3D graphics

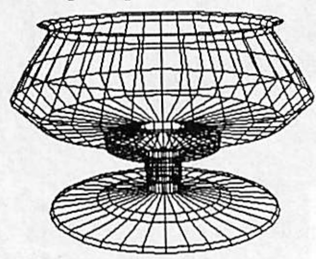
Creating *Elite*-type wire frame graphics has been made a little easier with a new graphics language from Silicon Vision.

The *Realtime Graphics System* adds 44 new star commands to the BBC micro which enable you to create, edit and move 3D graphics from Basic or machine code.

The objects can be rotated, stretched, zoomed and modified from any direction. The chip also has its own screen handling routines, which means that fast 3D animation can be done from Basic.

The graphics output can also be intercepted. According to Silicon Vision, this means the system can be made compatible with other image processing boards, like the Pluto, Prisma 2 and CMS colour cards.

Macros can also be created to build up shape libraries.



**Realtime graphics**

The language itself comes on a 32k chip, but it looks to the micro like a 16k chip.

There are also five discs containing utilities and applications. These include the main system programs for creating and editing shapes, plotter driver programs, a database library disc and some demo programs.

Dump routines are included for Epson-compatible printers. Pictures can also be dumped to disc for use with other printer drivers or with other drawing programs, like *AMX Art*.

The discs are available in several formats, including standard Acorn DFS, plus ADFS versions on both 5.25-inch and 3.5-inch discs. The system is also compatible with the 6502 second processor, which enables more complex shapes to be drawn.

The *Realtime Graphics System* costs £79.95.

# Blunderbox

A mistake was made in the Compact Personalised Desktop step-by-step instructions on page 102 in the December 1986 issue of *Acorn User*. The disc file $.SPRITE is not needed. Instead, the commands it contained should be put in the !BOOT file, so the complete !BOOT file should now read:

```
*DIR $
*SRLOAD SPRITER 8000 4 Q I
*SRLOAD PMFS 8000 5 Q I
*SPRITE
*SLOAD WIMPSPR
*BASIC
CHAIN "MENU"
```

Thanks to Mr A Barkley of Evesham and others who have pointed this out.

# Contacts

*Clares Micro Supplies:* 98 Middlewich Road, Northwich, Cheshire CW9 7DA.
*Griffin and George:* Bishop Meadow Road, Loughborough, Leicestershire LE11 0RG.
*Clwyd Technics:* Unit 4B, Antelope Industrial Estate, Rhydymwyn, Mold, Clwyd CH7 5JH.
*Computer Concepts:* Gaddesden Place, Hemel Hempstead, Herts HP2 6EX.
*LCL:* Melody House, Greys Road, Henley-on-Thames, Oxon RG9 1QU.
*Prestel:* Telephone House, Temple Avenue, London EC4Y 0HL.
*Silicon Vision:* 47 Dudley Gardens, Harrow, Middlesex HA2 0DQ.
*Spastics Society:* Education Division, 840 Brighton Road, Purley, Surrey CR2 2BH.
*TTNS:* PO Box 7, 200 Grays Inn Road, London WC1X 8EZ.

# Body Talk

A teacher has come up with a novel type of computer monitor – a set of sensors which monitors bodily functions using a BBC micro. The package is aimed at schools, colleges, athletes and health clubs.

The sensors measure functions like pulse, temperature, skin resistance and breathing. The data collected from these modules can be fed into a spreadsheet-like profile program, building up a complete picture of a person's condition.

To read all this data, an adapter is to be released which doubles the number of analogue inputs to eight.

Christopher Smith, a teacher at Tabor High School in Braintree, developed the sensors with funds from the Health Promotion Research Trust, which is linked to the Association for Science Education.

Three of the modules are available through Griffin and George, which is selling as the Griffin Body Sensor System at prices between £85 and £160.


Available for BBC 'B'
and soon for
AMSTRAD CPC SERIES
CBM 64/128
SPECTRUM 48/128
FIREBIRD SOFTWARE, FIRST FLOOR
64-76 NEW OXFORD ST, LONDON WC2
FIREBIRD IS A REGISTERED TRADE MARK
OF BRITISH TELECOMMUNICATIONS PLC
PRICED:
£14.95 CASSETTE
£17.95 DISC (CBM, BBC)
£19.95 DISC (AMSTRAD)
CHOLO
FIREBIRD
GOLD

# READER SURVEY

# Three Compacts to be won!

Now you've got a chance to tell us what you think of *Acorn User* and how you want it to develop over the next year – and a chance to win a Master Compact too. We want you to tell us what you'd like to see change, so we can make *Acorn User* a better magazine.

We've got three Compacts, with monitors, to give away to readers who fill in the survey and write the best slogan for *AU*.

The survey answers will be compiled statistically, but each individual reply will be kept confidential. Remember that all the answers will help us to give you the magazine you want. The *AU* listings on Micronet are a result of the last reader survey.

To fill in the survey, just tick the boxes you think apply to you – please try to be honest. A photocopy of the survey pages will do just as well if you don't want to tear your copy of *AU*. If you want to make extra comments, then please put them on a separate sheet of paper. Then put your name and address below, and your slogan idea at the end of the replies. Send the completed survey to *Acorn User* survey, Redwood Publishing Ltd, 141-143 Drury Lane, London WC2B 5TF. Forms should be returned by Monday, May 25 1987.

Name______________________________

Address______________________________

_____________________________________

To spur you on to answering the questions, we've got three of Acorn's newest micros on offer – one Master Compact with a colour monitor, and two monochrome systems, together worth over £1700. The Compact is a complete package.

* 128k RAM and 64k ROM computer
* built-in 3.5-inch disc drive and ADFS
* BBC Basic and Logotron Logo
* *View* and *ABC* wordprocessors
* colour or monochrome monitor

The colour system retails at £688; the mono systems are worth £539 each.

Writers of the best slogans will be notified by post, and their names printed in *AU*. The Editor's decision is final.

## YOUR COMPUTER SYSTEM

**1 What micro(s) do you own?**

☐ 01 BBC model B
☐ 02 BBC model B+
☐ 03 Master 128
☐ 04 Master Compact
☐ 05 Atom
☐ 06 Electron
☐ 07 Master 512
☐ 08 none of these

**2 Do you use another micro, eg, at work?**

☐ 01 no
☐ 02 an Acorn micro
☐ 03 IBM PC or compatible
☐ 04 other ____________

**3 Which of the following ROM chips are fitted in your micro?**

☐ 01 DFS 0.9
☐ 02 DFS 1.2 or 1770 DFS
☐ 03 ADFS
☐ 04 GXR

**4 Which of the following do you have or hope to buy in the next 12 months?**

| own | hope to buy | |
|---|---|---|
| ☐ 01 | ☐ 11 | monitor |
| ☐ 02 | ☐ 12 | disc drive |
| ☐ 03 | ☐ 13 | printer |
| ☐ 04 | ☐ 14 | mouse/trackerball |
| ☐ 05 | ☐ 15 | sideways ROM board |
| ☐ 06 | ☐ 16 | sideways RAM |
| ☐ 07 | ☐ 17 | shadow RAM |
| ☐ 08 | ☐ 18 | modem |
| ☐ 09 | ☐ 19 | second or co-processor |
| ☐ 10 | ☐ 20 | other ____________ |

**5 Has your micro ever needed repair?**

☐ 01 no
☐ 02 yes

**6 Where do you usually buy your hardware and software?**

| hard | soft | |
|---|---|---|
| ☐ 01 | ☐ 05 | high street store |
| ☐ 02 | ☐ 05 | Acorn dealer/specialist computer shop |
| ☐ 03 | ☐ 07 | mail-order |
| ☐ 04 | ☐ 08 | other ____________ |

**7 Please estimate your software expenditure over the last 12 months:**

☐ 01 under £20
☐ 02 £20 – £49
☐ 03 £50 – £99
☐ 04 £100 – £299
☐ 05 over £300

**8 and over the next 12 months?**

☐ 01 under £20
☐ 02 £20 – £49
☐ 03 £50 – £99
☐ 04 £100 – £299
☐ 05 over £300

## ABOUT YOU

**9 How old are you?**

☐ 01 14 or younger
☐ 02 15 – 24
☐ 03 25 – 34
☐ 04 35 – 44
☐ 05 45 – 54
☐ 06 55 or older

**10 What is your occupation?**

☐ 01 at school
☐ 02 at college
☐ 03 teaching/training
☐ 04 industrial/research
☐ 05 health/welfare
☐ 06 media/creative
☐ 07 small business
☐ 08 professional
☐ 09 managerial
☐ 10 admin/clerical
☐ 11 manual/tradesman
☐ 12 uniformed services
☐ 13 unwaged
☐ 14 other ____________

# READER SURVEY

11 Are you:
☐ 01 male ☐ 02 female

12 Do you authorise expenditure on computers at work?
☐ 01 yes ☐ 02 no

13 What do you mostly use your micro for?
☐ 01 recreation or hobby
☐ 02 education
☐ 03 home/club administration
☐ 04 business
☐ 05 other ______

14 What are the top five applications for your micro? Please number them in order of importance.
☐ 01 accounting
☐ 02 adventure games
☐ 03 arcade games
☐ 04 communications
☐ 05 control
☐ 06 database
☐ 07 graphics
☐ 08 home education
☐ 09 scientific/industrial
☐ 10 spreadsheets
☐ 11 teaching
☐ 12 wordprocessing
☐ 13 your own programming
☐ 14 other ______

15 If you write programs, which language(s) do you use?
☐ 01 Basic
☐ 02 Comal
☐ 03 Lisp
☐ 04 Logo
☐ 05 Pascal
☐ 06 Prolog
☐ 07 6502 assembler
☐ 08 other ______

## ABOUT ACORN USER

16 How do you usually get *Acorn User*?
☐ 01 by subscription
☐ 02 regular newsagent's order
☐ 03 buy it regularly
☐ 04 read someone else's copy
☐ 05 school or library copy

17 How long have you read *Acorn User*?
☐ 01 less than three months
☐ 02 4 – 6 months
☐ 03 7 – 12 months
☐ 04 more than a year
☐ 05 since the first year (1982)

18 If you bought this, how many other people read your copy?
______

19 Which of the following do you read regularly?
☐ 01 *Acorn User*
☐ 02 *A&B Computing*
☐ 03 *Educational Computing*
☐ 04 *Electron User*
☐ 05 *Personal Computer World*
☐ 06 *School Computer User*
☐ 07 *The Micro User*
☐ 08 *Times Educational Supplement*

20 Do you read the advertising in *Acorn User*?
☐ 01 never ☐ 03 most
☐ 02 some ☐ 04 all

21 Have you bought mail-order products from advertisements in *Acorn User*?
☐ 01 no ☐ 02 yes

22 From whom would you order products by mail-order?
☐ 01 any advertiser in *Acorn User*
☐ 02 only regular *AU* advertisers
☐ 03 only one of the well-known industry names

23 How do you rate the following?

| | good | fair | poor |
|---|---|---|---|
| News | ☐ 01 | ☐ 02 | ☐ 03 |
| Reader Services | ☐ 04 | ☐ 05 | ☐ 06 |
| Letters | ☐ 07 | ☐ 08 | ☐ 09 |
| Acorn Forum | ☐ 10 | ☐ 11 | ☐ 12 |
| First Byte | ☐ 13 | ☐ 14 | ☐ 15 |
| Hints & Tips | ☐ 16 | ☐ 17 | ☐ 18 |
| Joe's Jottings | ☐ 19 | ☐ 20 | ☐ 21 |
| Competitions | ☐ 22 | ☐ 23 | ☐ 24 |
| Technical features | ☐ 25 | ☐ 26 | ☐ 27 |
| General features | ☐ 28 | ☐ 29 | ☐ 30 |
| Yellow pages | ☐ 31 | ☐ 32 | ☐ 33 |
| Games Page | ☐ 34 | ☐ 35 | ☐ 36 |
| Hardware reviews | ☐ 37 | ☐ 38 | ☐ 39 |
| Software reviews | ☐ 40 | ☐ 41 | ☐ 42 |
| Business section | ☐ 43 | ☐ 44 | ☐ 45 |
| Education section | ☐ 46 | ☐ 47 | ☐ 48 |
| Abuser's Diary | ☐ 49 | ☐ 50 | ☐ 51 |

24 What are the three best articles you have read in *Acorn User*?
______ month ______ year ______
______ month ______ year ______
______ month ______ year ______

25 Do you type in any of the listings each month?
☐ 01 no ☐ 02 some ☐ 03 most

26 How would you like to see *Acorn User* and its services improve? Indicate your top three preferences.
☐ 01 *Acorn User* bulletin board
☐ 02 phone enquiry service
☐ 03 more *Acorn User* software
suggestion ______
☐ 04 more reader offers
suggestion ______
☐ 05 more magazine coverage of micros in business
☐ 06 articles about particular applications
suggestion ______

27 Thanks for completing the survey. Finally, to enter the competition for the Master Compact prizes, think up a snappy slogan for *Acorn User*:
______
______
______







**Approved Acorn dealer**

Peartree House, No 1 Blackstone Road, Stukeley Meadows Industrial Estate, Huntingdon, Cambs PE18 6EF. Telephone (0480) 50595




- First, you will receive a **5% discount** on all our advertised goods, and up to **25% discount** on all repairs.
- You will be sent **immediate details** of all new products.
- Your order will be given **priority**.
- You will have access to our **Technical Hotline**, to help with any problems you may have.
- At the end of each year we will send you a **Gift Voucher** to the value of 1% of the goods you have purchased during the year.

# Join our VIP Club and save £££££

Dear Customer

As part of our **First Birthday** celebration, we are offering a new **PEARTREE PRIVILEGE CARD**. It's our way of saying 'thank you' for your support and patronage over the last year. You represent our **future** and we hope that we can play an increasingly useful part in **yours**!

Your **Privilege Card** will cost you just £5—less than 10p a week—and for this you will receive **service** and **prices** which will be second to none:

All the benefits of this **Privilege Card** can be yours for just £5.00 per year; and as an added bonus, we will give you a **Gift Voucher** worth £6.00 when you introduce us to two of your friends who join the membership.

So please hurry and fill in the form on our last page, and mail it FREEPOST to our address.

Yours sincerely

V.G.M. *Marketing Director*

P.S.: The gift vouchers are only valid for purchase from Peartree. This Privilege Card offer is for private or company computer users, not for Educational and Governmental departments.

---




# The Acorn




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## HARDWARE

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## ECONET

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| ACH009 | **ECONET SOCKET KIT** | **£29.00** |
| ACH010 | **ECONET MODULE**<br>Upgrade cartridge for Master 128 | **£43.00** |
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All Peartree Disc Drives have a two year warranty by Akhter Computers

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| ACH027 | **SINGLE 40/80 DRIVE inc. PSU 400K MITSUBISHI** | **£135.00** |
| ACH028 | **DUAL 40/80 DRIVE, NO PSU 800K MITSUBISHI** | **£229.00** |
| ACH029 | **DUAL 40/80 DRIVE, inc. PSU 800K MITSUBISHI** | **£269.00** |
| ACH030 | **DUAL 40/80 DRIVE IN MASTER BRIDGE MITSUBISHI** | **£289.00** |
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| ACP003 | **MEGAMOUSE**<br>High quality UK manufactured<br>Fully AMX compatible | **£49.00** |
| ACP004 | **WATFORD VIDEO DIGITISER**<br>Use this superb digitiser by turning your favourite photographs into BBC's graphic mode, colour or monochrome | **£99.00** |
| ACP005 | **MAGAZINE MAKER**<br>Watford video digitiser and AMX page maker. Please state when ordering for Master or BBC B | **£139.00** |

## COMPONENTS

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| ACP007 | **EPROM 27256 32K**<br>32K eprom | **£4.95** |
| ACP008 | **EPROM 27128 16K**<br>16K eprom | **£2.95** |
| ACP009 | **EPROM 2764 8K**<br>8K eprom | **£2.75** |
| ACP010 | **8K RAM CHIP**<br>Low power ram chips used in sideways rams | **£2.50** |
| ACP012 | **EPROM ERASER WITH TIMER** | **£29.95** |
| ACP013 | **EPROM BLOWER**<br>Will program 2764, 27128, 27256 and 27513 | **£69.00** |
| ACP023 | **ACORN BBC B KEYBOARD** | **£49.00** |
| ACP025 | **ACORN UHF MODULATOR** | **£5.95** |
| ACP026 | **ACORN 8271 DISC CONTROLLER** | **£39.00** |
| ACP027 | **ACORN 8271 AND TTL**<br>Complete DFS kit | **£49.00** |
| ACP028 | **BBC B+ AND BBC B IBM LOOKALIKE CASE** | **£99.00** |
| ACP032 | **ZEP 100 TORCH CPM FOR BBC 64K CPM TORCH** | **£199.00** |
| ACP033 | **BBC MASTER DUST COVER** | **£4.50** |
| ACP034 | **BBC B DUST COVER** | **£4.50** |
| ACP035 | **BBC MASTER COMPACT DUST COVER** | **£7.50** |

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| ACP015 | **PACE NIGHTINGALE COMBO**<br>As above with Comstar software | **£129.00** |
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| ACP017 | **PACE AUTODIAL DISK**<br>Sets up Comstar for autodial | **£9.00** |
| ACP020 | **WS3000V21/V23 MODEM**<br>Hayes compatible | **£285.00** |
| ACP021 | **WS4000 SCHOOLS MODEM**<br>Autodial, autoanswer<br>Schools approved | **£159.00** |
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| ACS003 | **INTER SHEET**<br>40, 80 and 105 column mode multiple spreadsheet | **£42.00** |
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# MONITORS

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| MON002 | **MICROVITEC 1451 COLOUR MON MED**<br>Medium res monitor<br>Metal or plastic case, please state when ordering<br>RGB interface | £249.00 |
| MON003 | **MICROVITEC 1451 A/P COL MON MED**<br>As above with audio and composite video input | £279.00 |
| MON004 | **MICROVITEC 1441 MON COL HIGH**<br>Very high resolution monitor<br>895 pixels<br>RGB interface | £449.00 |
| MON005 | **TAXAN SUPER VISION 3 COL HIGH**<br>Compact 12" high resolution<br>RGB colour monitor<br>Super high contrast tube<br>640 × 252 line resolution | £349.00 |
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| MON009 | **KAGA KX 1201 GREEN MONITOR**<br>P31 | £99.00 |
| MON010 | **KAGA KX 1202 GREEN MONITOR**<br>P39 | £109.00 |
| MON011 | **KAGA KX 1203 AMBER MONITOR**<br>(PUL) | £109.00 |
| MON012 | **PHILIPS GREEN MONITOR** | £69.00 |
| MON013 | **ZENITH GREEN MONITOR** | £69.00 |
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| MIS012 | **BBC MASTER REFERENCE GUIDE PT1** | £14.95 |
| MIS013 | **BBC MASTER REFERENCE GUIDE PT2** | £14.95 |
| MIS014 | **VIEW MANUAL (BBC)** | £10.00 |
| MIS015 | **VIEWSHEET MANUAL** | £10.00 |
| MIS016 | **DFS OPERATING SYSTEM MANUAL** | £6.95 |
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| MIS024 | **BBC ADVANCE USER GUIDE** | £16.95 |

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**MISCELLANEOUS**

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| LDS002 | **BBC TO GREEN MONITOR LEAD** | £2.95 |
| LDS003 | **BBC TO SONY/KAGA COLOUR MONITOR** | £5.95 |
| LDS004 | **BBC TO MICROVITEC LEAD** | £2.20 |
| LDS005 | **PHONO TO PHONO LEAD** | £1.25 |
| LDS006 | **BNC TO BNC** | £2.95 |
| LDS007 | **BBC TO CASSETTE** | £2.25 |
| LDS008 | **BBC TO ACORN CASSETTE LEAD** | £2.25 |
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| LDS010 | **BBC TO SERIAL PRINTER** | £9.95 |
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| LDS014 | **MASTER COMPACT PRINTER LEAD** | £15.95 |

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| MIS001 | **PAPER 11×9.5 60GSM 2000 SHEETS** | £16.95 |
| MIS002 | **PAPER 11×9.5 70GSM 2000 SHEETS** | £19.95 |
| MIS003 | **PAPER 11.6×9.5 70GSM 2000 SHEETS** | £19.95 |
| MIS004 | **PAPER 11.6×9.5 80GSM 2000 SHEETS** | £21.95 |

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| MIS006 | **RIBBON FOR LX80 LX86** | £4.50 |
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# PEARTREE PRODUCTS

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An Acorn approved cartridge containing a card with special 'zero' profile sockets that allow you to fit compatible 8K or 16K EPROMS/ROMS. The cartridge is fully enclosed providing complete protection for your ROMS. Simple to use -no switching- complies fully to the Acorn (sideways) Rom Filing System. A.R.A.2 contains 2 sockets.... A single adaptor is also available....
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("ADI features an extremely comprehensive sector editor, and one of the finest I've seen" ...Tubelink on Prestel)
(supplied on 16K EPROM + manual)

## ADVANCED ROM MANAGER
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A friendly utility for ROM & sideways RAM. Examine ROM/RAMs, load files into RAM, move memory to/from SWays ROM/RAM, catalogue/kill ROMS, offer commands to specific ROMS, save ROMs to disc/tape, AUTOROM a file (inc. BASIC) to run from SWays ROM/RAM, execute specific machine code subroutine in a ROM, generate a ROM's checksum & CRC. "Represents amazing value for money. Go out and buy this real bargain"... Dec 86 Database Publications. (supplied on EPROM + manual)

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"DISC DRIVE COMPATIBILITY AT LONG LAST"... (Electron User June '86) this sums up AP4 & ACP's approach to producing products. AP4 is a fully ACORN compatible disc I/face & will accept any standard drive inc. PSU, runs 1770 DFS (as fitted in the B+ & Master), keeps page &Eøø, utils in ROM & provides a spare rom socket. "ACP's PLUS 4 comes out on top. I can recommend it to anyone..." (E.U. June '86)
...AP4 should be considered the standard interface for the Electron (AU July '86)
AP4 100 £199.00 (inc VAT & Securicor delivery)
AP4 400 £299.00 (inc VAT & Sucuricor delivery)

## ADVANCED PLUS 5
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(14) /E+ASR/ **£19.99**

An alternative to our AED(05) for Plus 3 and ASR users. This optional alternative DFS is designed for use in Sideways RAM (ASR) and allows the user to operate a disc filing system &Eøø when using the Plus 3 (in ADFS page would normally be &1Døø). The DFS is simply loaded using the software supplied with the ASR from disc. (optional upgrade for existing AED users £9.50 on return of original EPROM) (3½" ADFS disc + manual)

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| Vsheet " | (102) /E+1/ | £ 12.95 | 5¼" discs ds/dd" | (121) /M/B/E/ | £12.99 |
| VIEW & SHEET | (119) /E+1/ | £ 19.00 | 5¼ discs ss/sd | (122) /M/B/E/ | £ 8.99 |
| LISP cartridge | (103) /E+1/ | £ 9.99 | 3½" disc drives | | (please call for price) |
| E/Adv User Guide | (104) /E/ | £ 3.95 | 5¼" disc drives | | (please call for price) |
| LOGO cartridge | (106) /E/ | £ 29.95 | 2nd Drive Adaptor | (130) /E+3/ | £ 7.95 |
| PASCAL cartridge | (107) /E/ | £ 29.95 | Compact 2nd Drive Adaptor | (144)/C/ | £14.95 |
| VIEW pack BBC | (118) /B/ | £ 49.00 | 3½" library box 10 | (124) | £ 2.95 |
| AP4 100 | (140) /E+1/ | £199.00 | 16K EPROMS | (131) | £ 3.75 |
| AP4 400 | (141) /E+1/ | £229.00 | VIEWSTORE | (117) /M/B/(e) | £57.95 |
| AP5 + MOUSE Pckage | (143) /E+1/ | £125.00 | VIEWPLOT | (142) /M/B | £26.95 |

**Equipment codes /M/ = Master /B/ = BBC /E/ = Electron /E+1/ = Electron + Plus 1 /C/ = Compact**

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## Computers

**MASTER 128**

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| Complete With Internal Software | £420.00 |
| Master Turbo Upgrade | £113.95 |
| Master Econet Module | £46.00 |
| Master ET | £373.75 |
| Master 512 Upgrade | £217.35 |

The Master 512 upgrade board incorporates the Intel 80186 processor, plus 512K bytes of RAM. Digital Research DOS+, which is copatible with both MS/DOS version 2, and CP/M 86, allows you to run a large proportion of the most useful programs available. A dual 80 track disc drive is required to run programs on the 512. Provided free with 512 upgrade board are three GEM packages, GEM Desk Top, GEM Write, GEM Paint.

**NEW**

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. £86.25

| | |
|---|---|
| Eprom Cartridge | £14.95 |
| Reference Manual Part I | £14.95 |
| Reference Manual Part 2 | £14.95 |
| Acorn Prestel Adaptor | £125.00 |
| Acorn Teletext Receiver | £135.00 |

**NEW**

FILESTORE

Filestore provides shared access to file and printer services on Econet. The filestore consists of two units – a dual 3.5 inch floppy disc unit 1.2 Mbytes of storage (Filestore E01) which can be expanded with a high performance 20 Mbyte Winchester disk drive unit(Filestore E20).

| | |
|---|---|
| FILESTORE E01 | £952.00 |
| FILESTORE E20 | £829.00 |

**ECONET ACCESSORIES**

| | |
|---|---|
| 100m Cable | £89.00 |
| Station Lead Set | £29.00 |
| Econet Starter Kit | £99.00 |
| Econet Bridge | £199.00 |
| Level I Fileserver 40 Track | £99.00 |
| Level 2 Filesaver 80 Track | £235.00 |
| Print Server Eprom | £49.00 |

## BBC Upgrades

| | |
|---|---|
| 64K Upgrade Kit | £39.95 |
| 17/70 Upgrade Kit | £49.94 |
| ADFS ROM | £29.95 |
| Disc Upgrade Kit | £65.00 |
| Econet Upgrade Kit | £49.00 |
| DNFS ROM | £20.00 |

**NEW**

MASTER COMPACT LANGUAGES

Comal, Lisp, Iso-Pascal and Micro-Prolog are now available for use on the MAster 128 and the Master Compact.

| | |
|---|---|
| COMAL | £49.85 |
| LISP | £29.95 |
| ISO-PASCAL | £69.00 |
| MICRO-PROLOG | £79.95 |

## WORD PROCESSING SPECIAL PACKAGE

**PACKAGE 1**

Based on Master 128. The Twillstar All in One Word Processing Package contains a Master 128, View 3.0, Viewsheet, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. £899.00

**PACKAGE 2**

Based on Master Compact 128. The Twillstar package includes Compact 128, latest version of the View Word processor, single 640K disk drive, monochrome monitor, correspondence quality printer. All connecting cables for above and also 5 disks and some paper. £635.00



## BBC MASTER COMPACT

Twillstar continues to offer the MASTER COMPACT for your Home Education and Business needs! Complete with bundled software and an integral 3.5" Disk Drive in the following Systems:-

**SYSTEM 1** (inc. VAT) **£414.00**
*128K* *Single 640K Drive* *UHF Modulator* *Bundled Software*

**SYSTEM 2** (inc. VAT) **£488.75**
As System 1. With *12" High Res. Monochrome Monitor*

**SYSTEM 3** (inc. VAT) **£626.75**
As System 1. With *14" Medium Res. RGB Monitor*

**SPECIFICATIONS:** ★ Compatible with Master Series micro subset ★ 128K RAM inc 64K sideways RAM ★ 64K ROM inc 32K MOS, 16K BASIC ★ Up to 4 internal ROM sockets ★ 3.5" 640K formatted disk drive ★ OUTPUTS: Video/RGB/Printer/ Mouse or Joystick ★ Disk drive ★ (optional) Econet ★ Serial ★ 5V power from disk drive module ★ Usual 8 BBC disply modes inc. Mode 7 ★**BUNDLED SOFTWARE:** Pull down menus * Desk top inc. note pad, calculator * VIEW 3.0 * CARD INDEX * Full LOGO * BBC BASIC 4.0 * ADFS + Utils * Welcome suite * Tutorials * (1770 DFS under licence)

**2nd DRIVE KIT** £113.00

## Monitors

**MONOCHROME MONITORS**

| | |
|---|---|
| Phillips BM 7502 Green Screen | £79.00 |
| Phillips BM 7522 Amber Screen | £95.00 |
| Kaga KX 1202G Hi Res Green | £120.00 |
| Kaga KX 1203G Ultra Hi Res Amber | £120.00 |

Hantarex H x 12 Dark Gloss Screen high resolution monochrome monitor 12" Composite Video & Audio input £75.00

**COLOUR MONITORS**

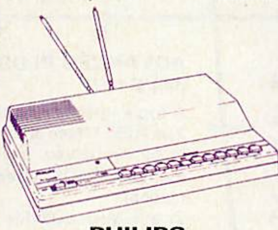
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| Microvitec 1431 Std Res | £201.25 |
| Microvitec 1451 Med Res | £255.00 |
| Microvitec 1441 Hi Res | £391.00 |
| Microvitec 2030 Cs 20 Std Res | £425.50 |
| Microvitec 1431 AP Std Res | £224.25 |
| Microvitec 1451 Ap Med Res | £293.25 |

Phillips CM 8533 Med Res monitor with dark glass etched screen composite video input RGB and Audio Input. £289.00

**Taxan Super Vision 620**



High Resolution colour monitor with several unique features, at an affordable price.
SUPERVISION 620
12" RGB High resolution colour monitor. Fully compatable with IBM, Apple, BBC and most other Personal Computers. 635 x 312 line resolution. Positive or negative sync input. Text colour switchable to green, amber, white or blue or inverse white. Super high contrast tube. Optional tilt-swivel base (with clock/calendar available). Special introductory offer. £299.00

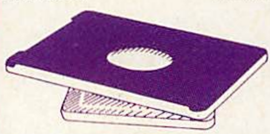


**PHILIPS MONITOR TO TV CONVERTER £69.00**

HOW TO TURN A DEDICATED MONITOR INTO A FIRST CLASS TV SET?
SIMPLY SLIDE THE SWITCH ON THE TV TUNER.
The Philips AV 7300 TV tuner turns any colour monitor (with CVBS and audio inputs) into a first class TV set, giving you extra versatility and value from your monitor. A convenient TV/computer switch allows the tuner to stay permanently connected to the computer and at the same time to a TV antenna.

**OUTSTANDING PERFORMANCE OUTSTANDING VALUE**
Just released by Hantarex 14" Colour Monitor Standard Resolution RGB PAL Audio Input (Inc. VAT) £175.00

**SPECIAL OFFER**
Mitsubushi 1404 Medium Resolution Monitor with 640 X 200 Pixels RGB available with IBM or BBC Leads. £229.00



**SWIVEL BASE**
Tilt and swivel base for 12" or 14" monitor or TV. "Looks very elegant" £17.25

## Disc Drives

**MITSUBISHI DISC DRIVES**

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 Track switchable at the front and have two years warranty.

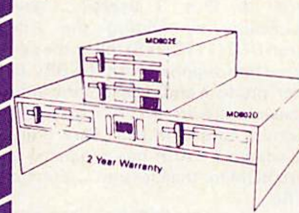
**5¼" Drives without P.S.U.**

| | |
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| MD 400A Single 400K Double Sided | £118.00 |
| MD 802C Dual 400K Double Sided | £219.00 |

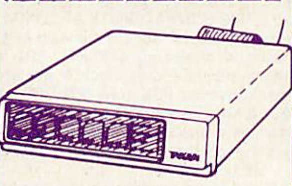
**5¼" Drives with P.S.U.**

| | |
|---|---|
| MD 400B Single 400K Double Sided | £135.00 |
| MD 802E Dual 400K Double Sided | £249.00 |

**SPECIAL**
MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. £269.00




## Printer Buffer




Now available
Taxan Multipurpose Type Printer Buffer KIF-4308 compatible with any Centronics interface printer £149.00

## GENERAL COMPUTER ACCESSORIES

MODEMS EPROMS
Components and spare parts
Joysticks
Disk storage boxes
Dust covers
and lots more

The latest range of Software
Business Education
Games
All in stock, Call for details

**NEW**

MASTER OVERVIEW

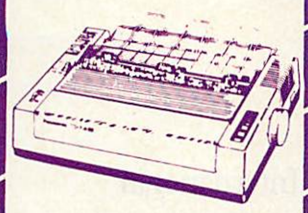
This package allows Master 128 owners (who already benefit from VIEW and Viewsheet) to add the *rest* of the VIEW family with the purchase of only one package. Overview is a sophisticated combination of ViewSpell and ViewStore on ROM Cartridge and ViewPlot, ViewIndex and Printer Driver Generator on Disk.
MASTER OVERVIEW £98.90

**YOUR ONE STOP MEGA-COMPUSTORE FOR HOME, EDUCATION & BUSINESS NEEDS!**

# Printers

## NEW PANASONIC NEW

**Panasonic KX-P1081** Just released the faster and enhanced KX-P1081. 120 cps in draft mode. 24 cps in NLQ mode. Fully Epson RX80 and IBM Matrix and Graphics Printers compatible. Standard friction and tractor feed. Operator accesible print mode switch. Standard 8 bit parallel interface. RS232 interface is optional **£179.00**



## Juki 5510

**- Gives you 180 CPS & NLQ Standards £269.00**

...and thats not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instant compatibility with both the Epson and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets. If you need colour too, the optional Juki 5510 Colour Kit gives you seven colours. **£112.00**

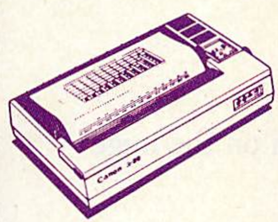
## EPSON PRINTERS

Epson FX 800 and FX 1000 range offers superior printing and technical features. 200 cps in draft and 40 cps in NLQ. Complete with tractor and friction feed as standard. Offering IBM compatibility, full graphics. Also includes two NLQ fonts, 10,12,17 and 20 cpi, double height and double width with 8K buffer built in.

| | |
|---|---|
| FX 800 | **£369.00** |
| FX 1000 | **£499.00** |
| FX 800 Sheetfeeder | **£141.00** |
| FX 1000 Sheetfeeder | **£163.00** |

Epson EX 800/1000 High speed printers. 300 cps in 12 cpi mode. Also offers four colour printing.

| | |
|---|---|
| EX 800 | **£465.00** |
| EX 1000 | **£545.00** |
| Colour option for both | **£62.00** |



## CANON 55A

Wide version. Fully IBM compatible. **£399.00**

## CANON PW1080A

80 column printer with 160 cps draft and 40 cps NLQ with built in friction and tractor feed. Fully compatible with Epson FX80. Standard parallel interface. **£235.00**

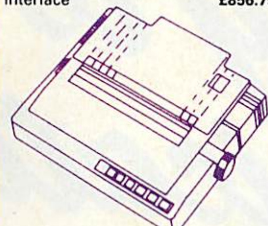
## FAST REPAIR SERVICE

*In house service department*
Repairs for computer printers and disk drives. Call 01-574 5271 and ask for our engineering depatment.

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**NEW SHOWROOM**
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## STAR NB15

Outstanding print quality at 300 cps in draft mode and immaculate 24 pin Letter Quality at 100 cps. Fully featured front control panel. Centronics parallel or RS232 serial interface **£856.75**



## STAR NL-10

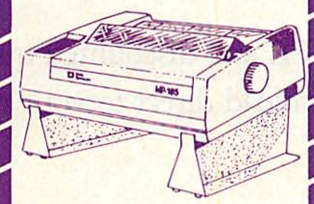
Fine Near-Letter-Quality, 100% compatibility and total reliability all in one easy to use printer. For quality, ease of operation and dependability, nothing beats the Star NL-10. You get outstanding print quality at 120 cps in draft mode and 30 cps in near letter quality. Plus, the sleek NL-10 offers full compatibility with most popular computers through plug in interface cartridges. Just insert the appropriate plug in interface cartridge for your IBM-PC, Commodore, Apple IIc or other parallel computer and your Star NL-10 is ready to print. Touch a button on the control panel to set the print pitch (3 choices), to select the typeface and to print in either draft or NLQ mode. You can even set left and right margins, make top of form settings and control forward and reverse feed in the smallest pitch. **£229.00**

## STAR NX-15

Same as Star NL-10 but with 136 column width. Both Epson and IBM compatible **£399.00**

## MP200

200 cps in draft. 40 cps in NLQ mode. 7K buffer as standard (128 downloadable characters in NLQ) optional 8K memory. IC font cards. Auto insert–Loads paper automatically to top of form. User friendly control panel–easy print pitch selection. I/F board–quick change of interface to match applications. Cut sheet feeder (optional double bin auto sheet feeder). IBM compatuble. **£274.85**

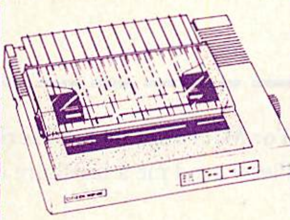


## MP201

Same as MP200 with 136 columns **£318.55**

## MICRO P MP165

80 Columns. 165 cps in draft mode. 35 cps in NLQ mode. Ultra high resolution graphics. Friction and traction feed. Compatible with all major micros. Quiet and easy to use. 2 Year warranty. Epson or IBM compatible control codes. **£199.00**

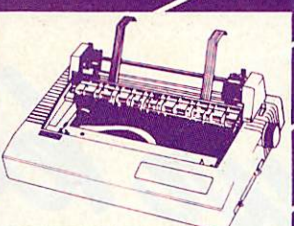


## CITIZEN MSPIOE

The new MSPIO with 160 CPS Draft and 40 CPS NLQ. With TWO years Warranty **£269.00**

## CITIZEN MSP-15E

17" Wide carriage . 136 column, operating at 160 cps and at the push of a switch will print near letter quality at 40 cps. Fully Epson and IBM compatible. 8k of standard buffer built in. Standard Centronics are optional RS232 **£379.00**

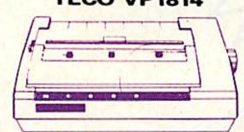


## CITIZEN 120D

Dot Matrix Printer. The 120D precision printer brings to the small business, educational and home user good quality and attention to detail. Its compact size, host of standard features and built in quality and reliability that supports Citizen's unique **full TWO-YEAR warranty** make it a must for all computer users. Fast draft output: 120 cps. Built-in NLQ: 25 cps. IBM and Epson compatible. Plug-in interface cartridge. Tractor and friction feed as standard. Optional cut sheet feeder. **£179.00**

## SOURCE
*The Complete Solution*

**INTRODUCES THE NEW TECO VP1814**



Dot matrix printer. VP1814 is fast highly reliable and easy to operate.
☆ Standard 80 column
☆The high-speed, low energy consumption 9 wire dot head gives printing speed of 189 cps and NLQ speed 36 cps
☆Bi-directional, Logic seeking in text mode
☆The use of fan-fold, roll or cut-sheet paper is possible with adjustable sproket pin feed and friction feed
☆Offers emphazised, double print, super script, sub script
☆Justified print mode are also available including left, centre, right and full justification
☆9 graphic modes are available
☆Both download and inprint buffer can exist simultaneously
☆7K input buffer standard can be expanded to 15K
☆Printing modes selectable at front panel (NLQ/draft, Pica/Elite, enlarge, emphasize, condense, italic
☆11 Language international character font is internalized
☆Both IBM and Epson compatable

MAIN UK DISTRIBUTOR
SPECIAL INTRODUCTORY PRICE
(inc. VAT) **£229.00**

## DAISYWHEEL



## PANASONIC KX-P3131

A Fully Formed Serial Impact Daisywheel printer with print speed of 17cps. Diablo compatible print wheels. Print pitches available are: 10, 12, 15 and proportional spacing. Standard friction feed and optional tractor. Paper width 13.5 inches. Standard Centronics optional RS-232C. Built with 6K text buffer expandable to 32K buffer. **£249.00**

## STAR POWER TYPE

**£229.00**

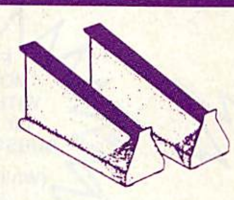
## BROTHER HR 20

The new Brother Daisywheel HR 20 8K standard buffer upgradable to 16k. Comes standard with serial and parallel port **£369.00**

## DAISYWHEEL PRINTERS

QUENDATA DWP 1120
with optional tractor/sheet feeder and 13" paper width facility. This Daisywheel printer with 20 CPS has 96 character printwheel compatible with the QUME. Standard centronics interface.

| | |
|---|---|
| (optional RS232 C) | **£169.00** |
| Juki 6100 | **£285.00** |
| Juki 2200 | **£275.00** |
| Juki 6300 | **£799.00** |



## PRINTER STAND

Fits nearly any width of printer. Allows paper storage and gives ideal viewing position. Can also be used for computers and monitors. Steel construction prevents bending or buckling **£18.00**

## How to Order

**You can purchase any of the items listed. All you have to do is write your requirements on a sheet of paper, and we will despatch your goods within 24 hours, subject to availability. Please add the following amounts for Postage and Packing.**

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|---|---|
| Items below £10.00 | add **£1.50** |
| Items below £50.00 | add **£2.50** |
| Items below £100.00 | add **£3.50** |
| Items over £100.00 | add **£8.00** |

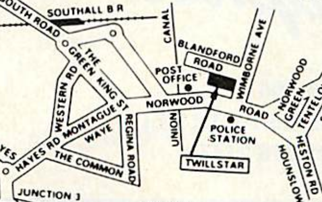
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All prices include VAT at 15%
Prices correct at time of going to press but subject to change without notice
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# With the AMX range of Software, you can now forget about the Mac, the St., the Amiga, Windows and Gem.



It's no surprise that nearly all new 16 bit 'state of the art' micros now come with a Mouse and Wimp environment (Windows, Icons, Menus and Pointers) as standard.

With the BBC you already own one of the classic micros and by simply adding the AMX range of software you can achieve the same ease of use, freedom and versatility of much more sophisticated computers.

The AMX Mouse and compatible software – it's what you and your BBC micro have been missing.




## ART AND MOUSE OPERATING SYSTEM

**AMX MOUSE PACKAGE 16K Rom and Disc — £79.95**

There's not much joy in a joystick and keyboards can be all fingers and thumbs. Acclaimed by the press as 'the best input device', already over 30,000 BBC users have adopted an AMX Mouse. Available for the BBC, B+, Master 128 and Master Compact. Please state version when ordering.

**AMX SUPERART AND MOS (only) — £49.95.**

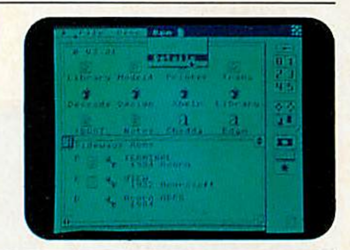





## GRAPHIC DFS FRONT END

**MAX 16K Rom — £19.95**

MAX provides an easy to use graphic based front end to your computer's disc filing system including a comprehensive set of disc management operations such as cataloging, copying, deleting and re-naming, you can also run programs from within MAX. Available for the BBC, B+, Master 128 and Master Compact. Please state version when ordering.





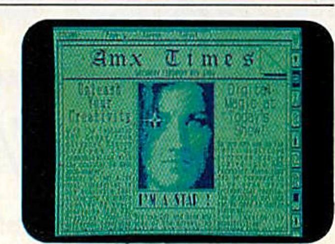

## DESKTOP PUBLISHING

**AMX PAGEMAKER 2 x 16K Rom, 2 x Disc — £49.95**

Produce professional documents and newspapers with text and graphics, supplied with 16 variable typefaces it has many graphic functions including cut, copy, paste, etc. Available for BBC, B+, Master 128 and Master Compact.

**EXTRA! EXTRA! 2 x FLIPPY DISC — £24.95**

300k fantastic clip art, over 25 fonts, and utility software.





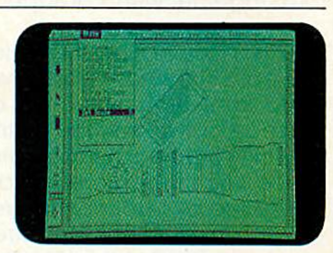


## COMPUTER AIDED DESIGN

**AMX DESIGN 32K Rom and Disc — £69.95**

A highly sophisticated CAD package allowing drawings such as a PCB design up to the most intricate architectural drawing.

Advanced features include full zoom and macro facilities, 58 x 58 screen canvas, fully supported printer and plotter output. (Launch date Feb. 1987). Available for the BBC, B+, Master 128 and Master Compact.



There is also a growing list of additional AMX software requiring the original AMX Art Rom or Super Art Rom including:
AMX 3D Zicon **£24.95**, AMX Database **£24.95**, AMX XAM **£24.95** AMX Mind Games **£14.95**, *AMX Utilities **£14.95**, *AMX paint Pot **£14.95**.
*These programs are only suitable for use with the original AMX Art/Rom which can be purchased with a mouse for **£69.95**
A Mouse (only) can be purchased for **£34.95** direct from AMS, using the order form enclosed in each of the four major software packages (see screen shots).
These superb products are available from all good computer dealers or direct by cheque, access or visa. All prices include VAT and post and packaging.







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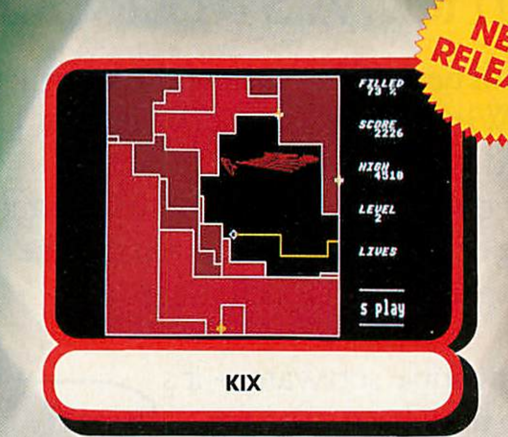
TUBELINK ON PRESTEL PAGE 2582182 SUPPORTS THE AMX MOUSE AND ALL AMS SOFTWARE.

# The Superior Collection




For the BBC Micro

NEW RELEASE



KIX



Voted COMPUTER GAMER'S BBC MICRO GAME OF THE YEAR 1985



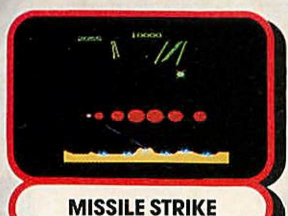
REPTON 2



DEATHSTAR



SPACE PILOT



MISSILE STRIKE



BATTLE TANK



CRAZY PAINTER



OVERDRIVE

## A New Concept in Compilations

**The Superior Collection Volume 2** features one brand new game, Kix, together with 7 of Superior Software's smash hits for the BBC Micro.

**Kix** is a fascinating strategic game in which you play the role of the intrepid Kix, whose objective is to take control of each of 20 quadrants; you must cover at least 75% of a quadrant's area in order to seize power over the entire quadrant. You can choose to move quickly or, to earn extra points, take a slower pace — but be ready to speed up immediately if you get cornered. The quadrants are guarded by Tracers who are aided and abetted by the fast-moving Fuse. Two excellent soundtracks add to the atmosphere of this fantastic game, which is worth at least £7.95 in its own right.

| | |
|---|---|
| BBC Micro dual cassette | £9.95 |
| BBC Micro 5¼" disc | £11.95 |
| BBC Master Compact 3½" disc | £14.95 |

Here's what the computer press said about some of the other titles on this compilation package:—

**REPTON 2:** "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!" . . . ACORN USER

**DEATHSTAR:** "Deathstar is a super fast, all action arcade classic. It's the sort of game that you can't put down . . . The graphics are excellent and the scrolling is very smooth in all four directions. The pace is fast and furious even on the starting screen. This action packed game is recommended for all arcade gamers." . . . ELECTRON USER

**SPACE PILOT:** "The professional presentation — well up to the usual Superior standard — coupled with the incredible addictiveness makes Space Pilot a must for all shoot'em-up fans.

| | | |
|---|---|---|
| Instructions | 65% | |
| Playability | 95% | Awarded |
| Graphics | 90% | ★★★★★ |
| Value for Money | 65% | (Top Rating)" |

. . . HOME COMPUTING WEEKLY

**CRAZY PAINTER:** "Great sound and graphics, smooth and accurate animation, responsive and simple controls.

| | | |
|---|---|---|
| Instructions | 70% | |
| Playability | 100% | Awarded |
| Graphics | 100% | ★★★★★ |
| Value For Money | 100% | (Top Rating)" |

. . . HOME COMPUTING WEEKLY

All games are compatible with the BBC B, B+ and Master series computers.




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# MICRO MEDIA Computer Supplies

**0707 52698 or 0707 50913** Dept. AU Rydal Mount, Baker Street, Potters Bar, Herts EN6 2BP

## Printer Ribbons

Mixed types for quantity breaks

| | 2+ | 5+ | 12+ |
|---|---|---|---|
| **Acorn** AP 80 | 2.70 | 2.30 | 2.10 |
| AP 100 | 2.70 | 2.30 | 2.10 |
| Ink Jet Cartridge | 7.50 per pack of four | | |
| **Brother** M1009 | 3.50 | 3.00 | 2.80 |
| Red Brown Blue Green | 4.95 | 4.65 | 4.25 |
| HR 15 MS | 3.30 | 2.90 | 2.60 |
| HR 15 Fabric | 3.40 | 3.00 | 2.70 |
| **Canon** PW1156/1080 | 3.20 | 2.70 | 2.50 |
| Red Brown Blue Green | 4.70 | 4.20 | 3.90 |
| **Centronics** GLP | 3.50 | 3.00 | 2.80 |
| Red Brown Blue Green | 4.95 | 4.65 | 4.25 |
| **Daisystep** 2000 M/S | 2.90 | 2.40 | 2.20 |
| Fabric | 4.10 | 3.80 | 3.50 |
| **Epson** FX/MX/RX 80 | 2.80 | 2.40 | 2.20 |
| Red Brown Blue Green | 4.00 | 3.30 | 3.10 |
| LX 80 | 2.80 | 2.40 | 2.20 |
| Red Brown Blue Green | 4.00 | 3.30 | 3.10 |
| **Juki** 5510 | 2.80 | 2.40 | 2.20 |
| Red Brown Blue Green | 4.00 | 3.30 | 3.10 |
| 6100 MS | 2.30 | 1.90 | 1.70 |
| 6100 SS | 1.40 | 1.10 | 1.00 |
| 2200 Fabric | 3.60 | 3.30 | 3.10 |
| 2200 SS | 3.00 | 2.60 | 2.40 |
| 2200 Corr | 3.90 | 3.50 | 3.30 |
| **Kaga** KP 810/910 | 3.20 | 2.70 | 2.50 |
| Red Brown Blue Green | 4.70 | 4.20 | 3.90 |
| **M/Tally** MT 80 M/S | 3.80 | 3.00 | 2.80 |
| **NEC** PC 8023 | 3.60 | 3.00 | 2.80 |
| **Oki** 80/82 | 1.50 | 1.20 | 1.10 |
| Red Brown Blue Green | 2.40 | 2.00 | 1.80 |
| **Panasonic** KXP 110 | 3.90 | 3.40 | 2.90 |
| **Quendata** 2000 MS | 2.90 | 2.40 | 2.20 |
| Fabric | 4.10 | 3.80 | 3.50 |
| **Seikosha** GP80 | 2.70 | 2.30 | 2.10 |
| GP100/250 | 2.70 | 2.30 | 2.10 |
| GP500 | 3.70 | 3.10 | 2.90 |
| Red Broiwn Blue Green | 4.90 | 4.60 | 4.20 |
| **Shinwa** CP80 M/S | 3.80 | 3.00 | 2.80 |
| **Smith Corona** | | | |
| D100/200 | 4.90 | 4.50 | 4.00 |
| EL1000/2000 M/S | 8.30 | 7.70 | 7.00 |
| Fabric | 3.70 | 3.40 | 3.30 |
| Corr | 4.80 | 4.50 | 4.30 |
| **Star** Gemini 10x 15x | 1.50 | 1.20 | 1.10 |
| Red Brown Blue Green | 2.40 | 2.00 | 1.80 |
| NL 10 | 5.50 | 4.80 | 4.50 |
| **Walters** WM80 M/S | 3.80 | 3.00 | 2.80 |
| 2000 | 3.70 | 3.30 | 2.90 |

**If the ribbon you require is not listed ring 0707 52698 and let us quote**

## Head Cleaners

Discs with 15ml cleaning solution

| | |
|---|---|
| 5¼" Head Cleaner | 4.00 |
| 3½" Head Cleaner | 5.00 |

## Printer Leads

Centronics lead to connect BBC to Epson Kaga Canon etc.

1 MTR 6.30 2 MTR 8.50

## Printout Binders

Adjustable hardback ring binder for 11x9½ to 12x9½ cont paper 40mm paper capacity

BLUE RED or BLACK £4.90 each

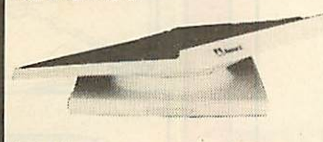
set of 5 indexes £2.30

## Disc Mailers

| | Price each 50+ | 100+ |
|---|---|---|
| Rigid Cardboard holds up to 3 discs | 40p | 28p |

## Swivel Bases

for Monitors



Pan tilt revolves around 360° 12.5° tiltable up and down adjustable by front mechanism.

12" Monitors **£12.00**

14" Monitors **£15.00**

## Adjustable Copy Holders

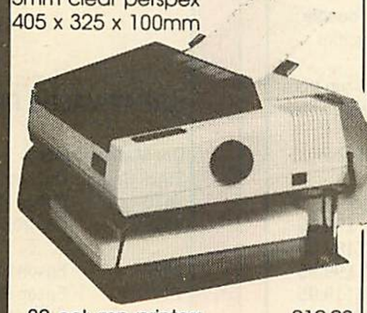


A4 Adjustable desk clamping. Magnifying cursor line paper height adjustable clip, paper thickness adjustment. **£20.90**

A4 Adjustable desk clamping. Plate positioned 360° **£13.90**

## Printer Stands

5mm clear perspex 405 x 325 x 100mm



| | |
|---|---|
| 80 column printers | £19.90 |
| 132 column printers | £24.90 |

## Micro Media Brand Universal 5¼" Discs

Reversible with 2 notches and index holes. Lifetime guarantee, hub rings, envelopes, labels. Suitable for 40 or 80 track. Packed in plastic library case.

| 10+ | 30+ | 50+ |
|---|---|---|
| **9.40** | **8.90** | **8.50** |

## Unbranded 5¼" Discs

Certified lifetime warranty hub rings, envelopes, labels

**Prices per 10 Discs**

| | 10+ | 30+ | 50+ |
|---|---|---|---|
| SS/DD 40 | 6.50 | 6.00 | 5.50 |
| DS/DD 40 | 7.50 | 7.00 | 6.50 |
| DS/DD 80 | 8.50 | 8.00 | 7.50 |

## Unbranded 3½" Discs

Lifetime Guarantee/label sets

| | | | |
|---|---|---|---|
| SS/DD | 17.00 | 16.00 | 15.00 |
| DS/DD | 19.00 | 18.00 | 17.00 |

## 3M 5¼" Lifetime Guarantee

| | | | |
|---|---|---|---|
| SS/DD 40 | 10.30 | 9.90 | 9.60 |
| DS/DD 40 | 12.50 | 12.20 | 11.90 |
| DS/DD 80 | 15.20 | 15.20 | 14.90 |

## 3M 3½" Lifetime Guarantee

| | | | |
|---|---|---|---|
| SS/DD | 20.50 | 20.30 | 20.00 |
| DS/DD | 25.50 | 25.30 | 25.00 |

## Verbatim Datalife 5¼"

| | | | |
|---|---|---|---|
| SS/DD 40 | 11.70 | 11.40 | 11.10 |
| DS/DD 40 | 14.70 | 14.,40 | 14.10 |
| DS/DD 80 | 19.70 | 19.40 | 19.10 |

## Computer Labels

Continuous fanfold, sprocket fed

| Price per 1000 | 1,000 | 2,000 |
|---|---|---|
| 70x36 | 4.20 | 3.80 |
| 89x36 | 4.30 | 3.90 |
| 89x49 | 5.90 | 5.30 |
| 102x36 | 4.50 | 4.20 |

Please state no. of labels across the sheet (1, 2 or 3).

## 9½" Backing Sheet for Fixed Tractor

| | 1,000 | 2,000 |
|---|---|---|
| 70x36 3 across | 4.20 | 3.80 |
| 89x36 2 across | 6.60 | 6.30 |
| 102x36 2 across | 6.70 | 6.40 |

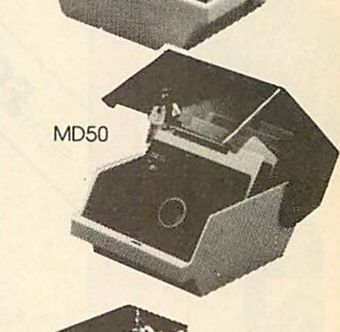
## Computer paper

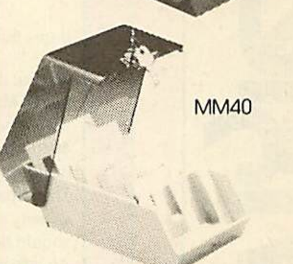
Plain fanfold, micro perf edges

| Size | Weight gsm | 1000's per box | Price per box 1 box | 2 bxs+ |
|---|---|---|---|---|
| 11x9½ | 60 | 2 | 14.40 | 13.60 |
| | 80 | 2 | 17.80 | 16.30 |
| EXACT A4 11⅔x9¼ | 70 | 2 | 24.00 | 21.30 |
| | 90 | 1 | 15.20 | 12.70 |

A4 Fixed tractor paper available




MM40

## Disc Boxes

| | 1 | 3+ |
|---|---|---|
| MM 100 5¼ x100 | 11.70 | 10.00 |
| MD 100 5¼ x100 | 11.70 | 10.00 |
| MM 50 5¼ x50 | 8.70 | 7.90 |
| MD 50 5¼ x50 | 8.70 | 7.90 |
| MM 40 3½ x40 | 8.50 | 7.40 |
| Rexel Mini Disc Box | 5.00 | |
| Plastic Library Case | 3 for 4.00 | |

All MM/MD boxes anti-static with lock

● Educational and HMG orders accepted. ● Trade enquires. ● Personal callers welcome. ● Open Sat 10am - 4pm

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# THE VIGLEN RANGE

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Viglen Viglen

## SYSTEMS

### COMPLETE SYSTEMS FROM VIGLEN

The following systems come complete with the BBC Master and drives fitted in the Viglen Master Console unit.

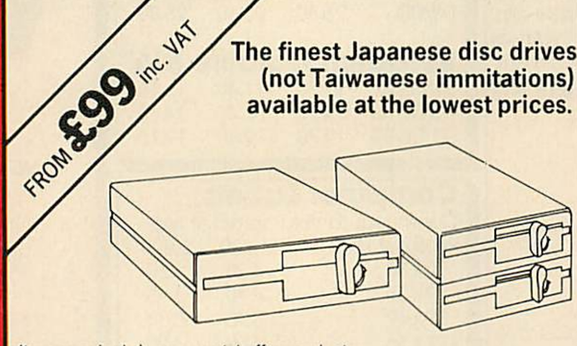
| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V250 | Viglen Master System 1<br>This system includes:<br>BBC Master128K in Console unit<br>Single 400K (760K double density)<br>40/80 disc drive.<br>Philips BM7502 Hi Res Green Screen Monitor | £699.00 |
| V251 | Viglen Master System 2<br>This system includes:<br>BBC Master 128K in Console unit<br>Dual 800K (1520K double density)<br>40/80 disc drive<br>Microvitec standard Res. colour Monitor. | £949.00 |

Other systems can be tailor made for your requirements, 3½" drive can be supplied instead of 5¼" at the same price. Please call.
To complete the system you only need to add a printer from any of the range. The current special offer printer that's particularly suited to the packages is the Centronics GLP at £119.95 inc. VAT.
Please add £12.00 for insured courier delivery.

## DISC DRIVES

FROM £99 inc. VAT

### The finest Japanese disc drives (not Taiwanese immitations) available at the lowest prices.



Items marked ☆ are special offer products.

All disc drives are supplied with a manual, packed utilities disc and a full 12 Months warranty (2 Year Warranty available) and are ready to plug in and use on a BBC B (fitted with a DFS) B + or Master micro. 40/80 Track drives have a switch which enables operation in either 40 or 80 track mode.
The capacities quoted are given in single density mode; for double density mode (1770 DFS + ADFS as in the Master) the capacities should be approximately doubled.
An integral power supply is not necessary as the disc drives run from the micro's power source however should you require drives with their own power supply, these are also available.
If your BBC B micro does not have a DFS fitted then you will also require the Acorn dfs kit.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| SP014☆ | Single 400K Viglen 40/80T Drive | £99.00 |
| SP019☆ | Dual 800K Viglen 40/80T Drive | £189.00 |
| V001 | Single 100K Viglen 40T Drive | £99.95 |
| V031 | Single 100K Viglen 40T Drive + PSU | £119.95 |
| V004 | Single 400K Viglen 40/80T Drive | £124.95 |
| V035 | Single 400K Viglen 40/80T Drive + PSU | £144.95 |
| V008 | Dual 800K Viglen 40/80T Drive | £234.95 |
| V038 | Dual 800K Viglen 40/80T Drive + PSU | £279.95 |
| V064 | 3.5 and 5.25 inch Drives in dual case with Power Supply | £263.95 |
| V062 | Single 3.5" 400K Drive + PSU | £129.95 |
| V063 | Dual 3.5" 800K Drive + PSU | £229.95 |
| V502 | 1770 or 1.2 DNFS Kit | £49.95 |
| V503 | Acorn ADFS Rom | £29.95 |

Please add £8.00 for insured courier delivery.

## PRINTER STANDS

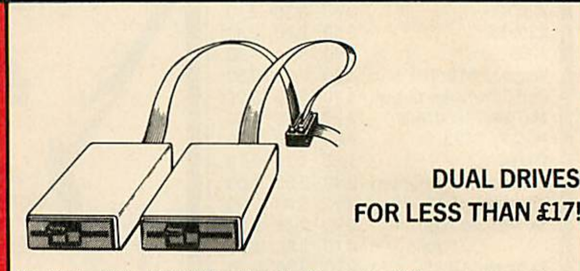
### CLEAR PERSPEX PRINTER STAND

The Viglen printer stands are beautifully finished in clear perspex and raise the printer high enough to put continuous stationary underneath.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V490 | 80 Column Printer Stand (15" × 13" × 3.5") | £19.95 |
| V491 | 136 Column Printer Stand (23.5" × 13" × 3.5") | £29.95 |

Please add £3 P & P

## DUCKS



### DUAL DRIVES FOR LESS THAN £17!

The Viglen Data DUCK (Dualling Up Connector Kit) converts any two single drives to a dual drive instantly. Simply plug the duck into the micro's disc drive socket and plug two single drives (any type and any make) into the duck to obtain a dual drive system accessed as drive 0 (and 2 if double sided) and drive 1 (and 3 if double sided). If neither single drive has its own power supply then you will require a Viglen power DUCK in order to obtain two disc drive power sockets from the micro.

* No soldering simply plugs in.
* No need to take disc drives apart to change links.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V084 | Viglen data duck | £16.95 |
| V085 | Viglen power duck | £7.95 |

Please add £2.50 for P & P.

## PRINTERS



### GREAT VALUE PRINTERS

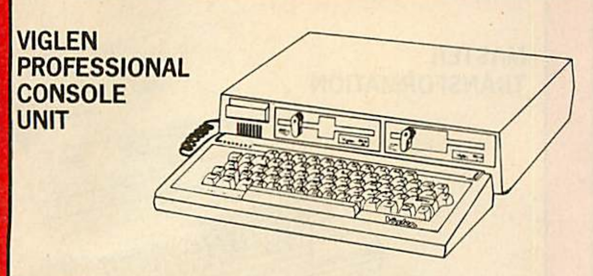
| Stock Code | Description | Price inc. VAT |
|---|---|---|
| **Dot Matrix Printers** | | |
| V410 | Canon PW1080A/TaxanKP810 | £259.00 |
| V409 | Centronics GLP | See Special Offer Box |
| V420 | Epson LX86 with tractor feed | £269.00 |
| V421 | Epson FX800 | £379.00 |
| V422 | Epson LQ800 (200 cps) | £559.00 |
| **Daisywheel Letter quality printers** | | |
| V400 | Juki 6100 | £279.00 |
| **Ribbons** | | |
| V462 | Canon PW1080A/Taxan KP810 ribbon | £5.95 |
| V463 | Epson MX80/RX80/FX80/FX85 ribbon | £5.95 |
| V464 | Centronics GLP ribbon | £3.95 |
| **Printer cables** | | |
| V495 | BBC micro/ Master printer cable | £7.95 |
| V497 | Master Compact printer cable | £7.95 |

Please add £8.00 for insured courier delivery and £1.50 for ribbon.

# THE VIGLEN RANGE

BBC CONSOLE UNIT

## VIGLEN PROFESSIONAL CONSOLE UNIT



Your BBC micro can be given the professional PC-look by replacing your existing lid with this smartly styled package which can house two disc drives, the Viglen Rom cartridge system, most internal boards and can support monitors including 14" television sets.

PCU Package includes: Keyboard case, Metal screened main unit, casing including internal fittings, 2 meter coiled cable to connect main unit to keyboard, blanking plates to blank out disc drive apertures, Keyboard label.

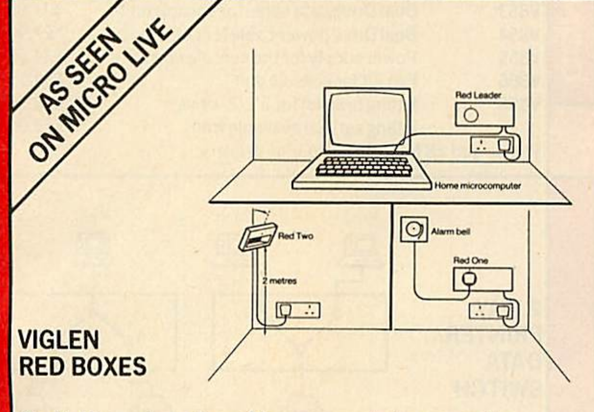
Other accessories are also available including units fitted with single or dual drives.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V851 | Viglen Professional Console unit for the BBC micro (PCU) | £49.95 |
| Accessories for the Professional Console unit | | |
| V852 | 2 Meter coil cable on its own | £14.95 |
| V853 | Dual drive data cable for console unit | £14.95 |
| V854 | Dual drive power cable for console unit | £7.95 |
| V855 | Power supply for PCU (capable of running two 1/2 height drives) | £32.95 |
| V856 | Fan kit for PCU (only necessary if your BBC normally gets extremely hot) | £34.95 |
| V857 | Extension keyboard on its own including coiled cable. | £29.95 |
| V858 | Fitting bracket for 3½" drive | £8.95 |
| | Fitting service available from | £15.00 |

Please add £6.00 for courier insured delivery.

RED BOX

AS SEEN ON MICRO LIVE




## VIGLEN RED BOXES

The Red Box system offers all home computer/pc owners the opportunity to run their own home control system. The Red Box starter system provides the first step to an almost endless string of possibilities, from time switching to security. Easy add-on options will give you the high-tec home of the future.

All Red Boxes are protected against interference, either malicious or accidental. Each device is assigned a unique, secret code, known only to the owner. All messages between devices are encoded with a secret key, making them even more secure.

All Red Box systems use powerful micro-processors; they are very easy to use and do not require any programming. Your computer controls the system by simple commands given to Red Leader through the keyboard.

The Red Box starter system comprises:

RED LEADER: a powerful micro Processor Controller Red BASIC programme language.

RED ONE: a computer controlled mains socket into which you plug the appliance to be controlled.

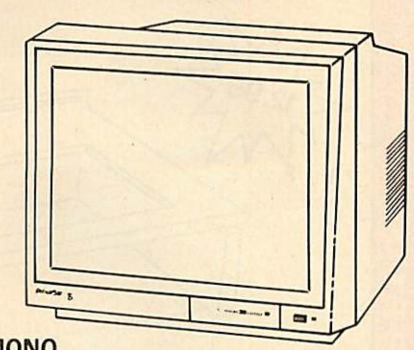
RED TWO: an infa-red sensor which automatically reports any movement to Red Leader.

RED BOX: home control at the touch of your micro.

| Stock Code | | |
|---|---|---|
| *V0899* | Programmable Security Device | £129.95 |

Please add £6.00 for insured courier delivery.

MONITORS



## COLOUR & MONO

All the following monitors are supplied with a cable to fit the BBC micro/ Master and Compact.

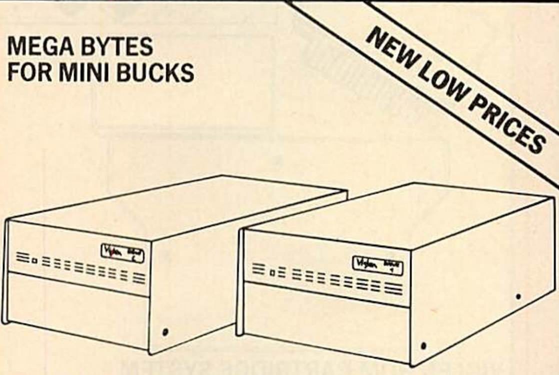
| Stock Code | Description | Price inc. VAT |
|---|---|---|
| **Monochrome Monitors** | | |
| V331 | Philips BM7502 Hi Res Green | £85.00 |
| V332 | Philips BM7522 Hi Res Amber | £95.00 |
| V333 | Taxan KX1201 Hi Res Green | £89.00 |
| **Colour Monitors** | | |
| V300 | Microvitec 1431 Std Res Colour Monitor | £229.00 |
| V301 | Microvitec 1451 Med Res Colour Monitor | £279.00 |
| V304 | Microvitec 1451APL Med Res Colour Monitor with PAL | £299.00 |
| V302 | Microvitec 1441 Hi Res Colour Monitor | £449.00 |
| V356 | Taxan Super Vision II | £349.00 |
| V357 | Taxan Super Vision III | £399.00 |

Please add £8.00 for insured courier delivery.

WINCHESTERS

## MEGA BYTES FOR MINI BUCKS

NEW LOW PRICES



Plug in 20 to 112 Megabytes of extra storage with the Viglen Winchester system.

The Viglen Winchester is ready to plug in and use on a BBC Master micro; for a BBC B or B plus you will merely need to fit the Acorn ADFS Rom. The Winchesters are 100% compatible with the Acorn Winchester and Acorn ADFS and will also work with the Acorn Master 512 board with DOS plus.

Drive 1 Winchesters are also available for backup or just more storage and simply plug into the back of the Drive 0 unit.

The Winchester package consists of: Winchester unit (cased with controller boards, power supply and fan), Master reference Manual part 1, Winchester user guide and Winchester utilities on disc (such as formatter, verifier, ADFS menu and sophisticated backup program allowing you to make fast backups on DFS discs, ADFS discs or Drive 1 Winchester.)

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| **Drive 0 Single** | | |
| V150 | VB20 20Meg Viglen Winchester | £649.00 |
| V152 | VB28 28Meg Viglen Winchester | £699.00 |
| V155 | VB40 40Meg Viglen Winchester | £1045.95 |
| V156 | VB56 56Meg Viglen Winchester | £1119.95 |
| **Drive 1 Second Drive** | | |
| V160 | VB120 20Meg Drive 1 Winchester | £549.00 |
| V162 | VB128 28Meg Drive 1 Winchester | £599.00 |
| V165 | VB140 40Meg Drive 1 Winchester | £819.95 |
| V167 | VB156 56Meg Drive 1 Winchester | £899.95 |
| V503 | Acorn ADFS Rom and Manual (Only necessary for BBC B or B Plus | £29.95 |

Please add £8 for insured courier delivery.

**SEND OFF YOUR ORDER NOW!**

ORDER FORM ON LAST PAGE OF VIGLEN SECTION

SALES HOTLINE 01 843 9903

Viglen

# THE VIGLEN RANGE

## PRINTER STANDS

12.95

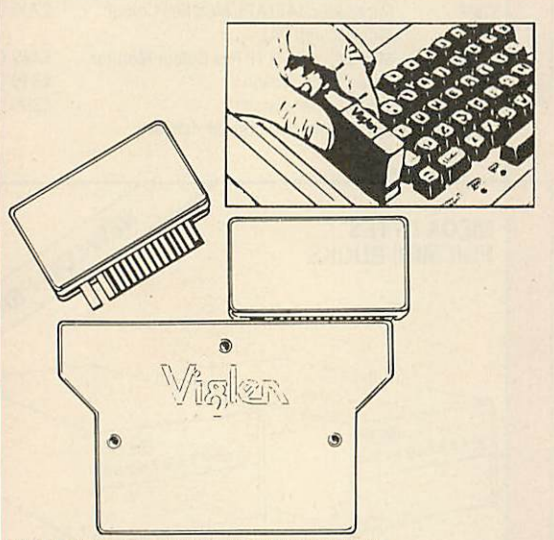
### NEW LOW COST PRINTER STAND

The Viglen low cost 80 column printer stand is made in high impact ABS plastic colour matched to most printers. It raises the printer high enough to put continuous stationery (up to 1000 sheets) underneath.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V492 | Viglen low cost 80 column printer stand (15" × 14" × 5") | £12.95 |

Please add £3.00 for postage and packing.

## CARTRIDGE SYSTEM




### VIGLEN ROM CARTRIDGE SYSTEM

Having fitted the Viglen Rom cartridge system to your BBC, Master or Master COMPACT, you can plug in your Roms/Eproms simply by inserting each one in a Viglen cartridge and plugging in whichever cartridge you want to use. The same Viglen cartridge can be used on all the micros mentioned and there is no need to switch the micro on and off between cartridge changes.

The Viglen cartridge system for the BBC micro consists of the cartridge cable assembly and socket, blanking off plates, 1 cartridge and cartridge storage rack. The cartridge socket when fitted protrudes from the rectangular slot on the left of the keyboard where the cartridges are subsequently inserted. It is simple to fit and requires no soldering.

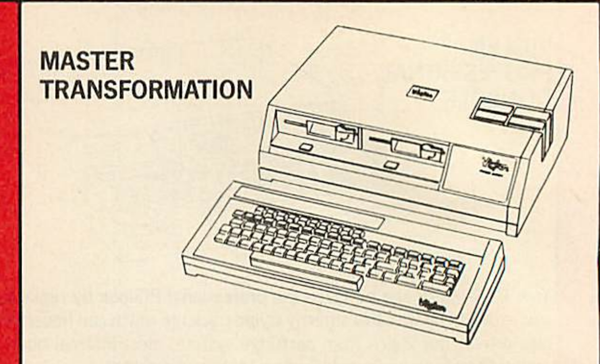
The Viglen cartridge system for the Master and Master COMPACT simply plugs into your Master cartridge slot (or COMPACT expansion port) and accepts two Viglen cartridges. On the Master you can plug in up to two Viglen cartridge systems thus giving you access to 4 Viglen Cartridges simultaneously. The system comes complete with 2 cartridges and cartridge storage rack. On the Master you can also use Viglen cartridges which have 32 and 64K paged Roms inserted.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V560 | Viglen Rom cartridge system for BBC | £12.95 |
| V559 | Viglen Rom cartridge system for BBC (low profile) | £12.95 |
| V550 | Viglen Rom cartridge system for Master | £14.95 |
| V561 | Single Viglen cartridge | £3.99 |

Please add £2.50 P & P (£00.50 for single cartridge).

## CONSOLE SYSTEM

### MASTER TRANSFORMATION



Give your BBC Master micro the professional PC look by replacing your existing lid with this smartly styled package. The system is strong and constructed in high impact ABS colour matched to the BBC Master and it gives your Master a very neat and impressive look.

- ★ Will support monitors including up to 16" TV.
- ★ Can house two 5 1/4" disc or Winchester drives.
- ★ Capable of housing 3 1/2" drives.
- ★ Will accept Acorn cartridges and the Viglen Master Cartridge system.
- ★ Full internal metal screening.
- ★ Also available with fitted drives (5 1/4", 3 1/2" or Winchester) or as a complete system including the Master.

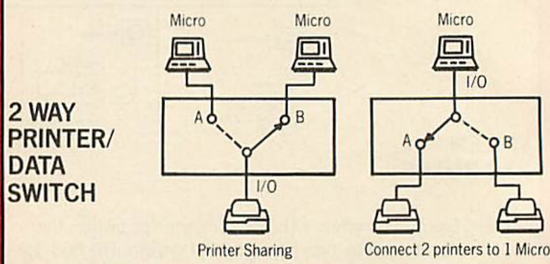
The Master console unit system package includes:
Remote keyboard case with cable.
Metal screened main unit casing including internal fittings for 5 1/4" drives.
Two switches which can be used for 40/80 track switching and can be either fitted on the front or rear of unit.
Two blanking plates to blank out any drive aperture that is not used.
Full labelling kit.
Fully illustrated fitting instructions.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V861 | Viglen Master Console unit | £59.95 |
| Accessories for the Master Console unit | | |
| V853 | Dual Drive data cable for console unit | £14.95 |
| V854 | Dual Drive power cable for console unit | £7.95 |
| V855 | Power supply for the console unit | £34.95 |
| V866 | Fan Kit for console unit | £34.95 |
| V858 | Fitting bracket for 3 1/2" drive | £8.95 |
| | Fitting service available from | £15.00 |

Please add £8 for insured courier delivery.

## SWITCHES

### 2 WAY PRINTER/ DATA SWITCH




The Viglen 2 Way Printer/Data Switch allows you to connect two printers to one computer or two computers to one printer, and to switch between them. All lines are switched (unlike other models) and hence the switch can be used with a combination of any type of computer and printer (or modem, or terminal, or any other data product).

All sockets on the parallel switch are centronics 36 way, female type. Serial versions are also available with 25 way "D" type, female sockets.

★ Compact size 7³⁄₁₆" × 5" × 2". ★ Push Button Operation.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V2000 | PAB2 Parallel 2 Way Printer/Data Switch | £49.95 |
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| V0493 | 36 Way Centronics to Centronics cable | £ 9.95 |
| V0494 | 25 Way D Type Serial to Serial cable | £10.95 |
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| V0496 | BBC to 25 Way D Type Serial Cable | £15.95 |
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SEND OFF YOUR ORDER NOW!

SALES HOTLINE 01 843 9903

Viglen Viglen

# LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

## HOME PUBLISHING

Sir, I understand that you are interested in schools which use the computer for desktop publishing. We don't do anything quite so grand, but *Pagemaker* and *Super Art* are used to prepare booklet covers and so on.

Some pupils use *Pagemaker* for magazine work after school. For example the fifth year produced a magazine as their business studies 'small business' and some of the pages were done with *Pagemaker*. Another




**Prepared using *Super Art***

used it to make T-shirt digitised pictures which they sold. *Acorn User*'s *Gallery Disc* picture of Max Headroom was very popular in this respect.

Within the classroom we use Beebug's *Design*, *Acorn User*'s *Easyplot* and several other programs which can be loaded into every computer cheaply. This highlights the problem with ROM-based software which, even with subsidy, is expensive to install in every machine. As we have model Bs we would also need to buy ROM expansion boards.

We purchase *Acorn User* every month and find it excellent. The suite of graph/plotting programs and *Easyplot* are ones we use regularly, but we have available several others which are used quite often.

Martyn Wilson
John Hanson School
Hampshire

**The June issue of *Acorn User* will be a special on publishing on your micro with a market survey, advice on running a magazine and one author's experience of publishing a book written with *View*.**

**Also, the summer term issue of *School Computer User*, distributed free to schools by computing advisers, will carry hints and tips on the subject.***

**We'd be pleased to see more from schools and other readers on their output.**

*** Subscription and order details from Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.**

## COMPACT QUESTIONS

Sir, Can you please tell me why you plan programs for the BBC Compact but when I try to buy them from your mail order section they are only made in 5.25-inch disc and not 3.5in Compact size? I tried to download your programs from Micronet but they can only be down loaded with a DFS system and not with an ADFS system. I find it very discouraging to have to keep typing in programs for the Compact that should be made available on 3.5in disc.

Can you please tell me when I can obtain 3.5in discs for your programs?

J Maloney
Wiltshire

**The *Gallery* and *Gallery Collection* discs were released in 3.5in format in March's issue to test demand for the Compact format. If we get the requests, then the discs will go into Compact format.**

**As for the Micronet problem, you should have a copy of the Acorn DFS on your Compact Welcome disc. With this loaded into sideways RAM you shouldn't have any problems downloading onto a DFS-formatted 3.5in disc.**

**If you don't have the Acorn DFS on your Welcome disc, contact Acorn who should give you one.**

## GAMES GRIPE

Sir, I write with reference to the amount of games reviews you publish in the pages of *Acorn User*. Just recently, there has been an increase in games released for the BBC, Electron, Master and Compact micros, but in the last three editions of your magazine, there have been five, four and two games reviewed respectively.

I do not wish to see the other features dropped, to turn *Acorn User* into a 'games rag', but I wish you could diversify your coverage to include games and entertainment software.

I hope I have made my point clear, and hope that you continue in the style and quality that has become your trademark over the years.

Simon Noddings
Cleveland

## VIEW HINT

Sir, I wonder if the following idea would be of interest to your readers. As a writer working with the BBC Master and *View*, I constantly use the same set-up with a changing text. I find the easiest way to back up a file is to change the disc, keeping the text in the computer memory. I have !BOOTed the contents of table 1 below.

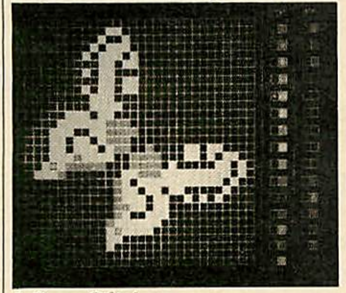
Sue Gattuso
Norfolk

```
*OPT 4,3
*WORD
MODE 131
NEW
*KEY 0 *DIR $:M         (for changing discs)
*KEY 1 SAVE:M
*FX 12,3                (cursor repeat rate)
*FX 202,48              (caps lock off)
SETUP FJI
PRINTER EPSON           (usual printer driver)
LOAD GO                 (usual letter layout)
NAME BEGIN              (prevents overwriting GO file)
```

**Table 1. Sue Gattuso's program for set-up**

## CALLIGRAPHY AND CROSS STITCH

Sir, Mike Turner's *Calligraphy* (Sept '86) and Anneke Sicherer-Roetman's *Cross Stitch* (Feb '87) are among the most ingenious of programs I have seen recently, and can be put to good use together. I use *Cross Stitch* to design double-height and triple-height alphabets using 16x16 and 24x24 areas of the ST2 design screen. When the design of a letter is satisfactory I revert to the command screen, and quit. A routine intercepts the quit and prints (in hex) the appropriate area of the ST2 pat% array. From this it is easy to write the data statements needed by *Calligraphy* for the new alphabet.



**A *Cross Stitch* screen**

I have a different outlook on printer-drivers (for example for *View* output) from most of your correspondents and contributers. I feel they should be independent programs operating on files saved from *View*. This method allows you to exploit the fact that *View* permits arbitrary letter-pairs in the edit-command column at the left, so that you can invent commands to exploit the facilities of a printer without restrictions of space. I take the view that alphabets and highlights should be entirely different and independent things, and use edit-commands to switch to expanded or NLQ or condensed; the one-character highlights mean underline or italicise. The only ordinary key that I reserve is the Raise/Tilde key, to initiate or cancel superscripts and subscripts. Emphatic and double-strike printing are set by edit commands.

Having written my own printer-driver on these lines, it was easy to introduce new commands to incorporate new alphabets designed by *Cross Stitch*, by appending modified *Calligraphy* code with (at present) two sets of data for double and triple height letters.

The system is made convenient by having *View* soft-key CTRL-f9 issue *BASIC¦ MCHAIN driver¦M, and making the driver end (when no more files are to be printed) by issuing *WORD.

Many thanks to Anneke Sicherer-Roetman and Mike Turner for the programs.

**R Taylor**
Oxfordshire

## NETWORKING ALTERNATIVE

Sir, As I am in the process of setting up a small network for teaching medical students, I was interested in the January file pusher program in the Network feature.

However, it does seem unnecessarily complicated. I have a very small network, so I don't need the sophisticated arrangement of determining which stations to push the program to, but I concede that for those with large networks, this would be useful.

My main criticism is concerning the technique of loading the program to be pushed in the host machine before pushing to the remote stations. As you say in the text, this does limit the size of files which can be transmitted.

Now I can't see why you need to load the program into the host machine at all. Why not just use PROCtrm to send an instruction such as 'CH."PROG"' or '*LOAD PROG'? This way you don't need PROCpk, PROCba or PROCmc. If you need to reset PAGE, that can still be done with PROCtrm. Not only is the Push program much smaller, but any size file can in fact be transmitted.

There is a further point which needs looking at. Suppose one or more of the remote machines has Basic paged out? For example, I make much use of Microtext, as I am sure many other educational network users will. If you try Push while a remote station is in Microtext, it will just hang up. No doubt the same would also be true with Logo or any other language.

This problem however, can also be solved with PROCtrm. Having sent PROCstop, you should then send PROCtrm (" ",T%). This will ensure that Microtext is in command mode. Now send PROCtrm("*BASIC",T%) and the remote station is ready to receive your program as above. You will find, however, that it is necessary to include a short delay between each of the above, to give time for the operations to take effect. I use I=INKEY(100).

**Bernard Wilson**
St Thomas' Hospital
London

**Robin Newman replies: I agree entirely with your comments. However, I would like to make one or two points. First, a program of the type you suggest consisting essentially of PROCtrm has already been published in the Network page in the December 1986 issue! There are however occasions when it is not convenient to use this simpler solution. You may not wish users to have access to the directory containing the program to be sent around the network.**

**Second, Push enables you to send programs around the network without having to have a fileserver at all! It works perfectly well on a machine fitted with disc and network interfaces, in which case it can be run with *DISC selected, and the program to be pushed loaded from disc before being sent around the network. This was the mode of use for the original program submitted by Scott Ling.**

**One intention of the Network page is to show how utilities can be written which use the facilities of Econet. If a useful utility is the end product of this process then that is a bonus!**

## DEJA VU DILEMMA

Sir, Scenario: Quiet semi. I am in attendance in the bedroom. Enter mother laden with February's *Acorn User*. Computer lights up as I notice the swelling yellow pages.

At this point I read the News section to find the 'nouveau' Man From Uncle: 'Scenario: High Street store. Euthymol Gall in attendance...' Feeling of 'deja vu' occurs. I check quickly through recent back issues. Heaven forbid! August '86 issue – the very same article! Is *Acorn User* turning into BBC 2 – the best snippets being repeats? This magazine cost me 1.3 spondulicks!

Please keep your enlightening publication original – it's far too good to spoil with repeats now!

**Paul Hodgson**
County Durham

**Last-minute problems meant we had to fill that column, and there was nothing else to hand! Sorry.**

## TURTLES FIGHT BACK

Sir, With reference to *Acorn User* March 1987 – 'Extend Your Output' by Chris Drage and Nick Evans. As your writer Chris Drage discovered at the recent High Technology and Equipment in Education Exhibition at the Barbican Centre, the Valiant turtle is very much alive, in demand, and running exceptionally well.

After a brief hiccup with supplies in January 1986, when Valiant turtles were still available ex-stock from major education distributors E J Arnold and Simnett's while Valiant reorganised and moved office and stores, we have gone from strength to strength over the last year.

Imagine therefore, how distressed we were to read of our demise in your March 1987 issue. Added to this insult your authors suggested that turtles which are remote controlled are (and I quote!) 'unreliable' and 'problematic'.

As a large number of your readers will know from their own experience, to use any robot – particularly a Logo-driven turtle – free from the encumbrances of primitive, trailing wires is a remarkable adventure for young children.

The new range of educational support materials, produced by educators and marketed by Valiant as Microworlds for Logo and turtles in the classroom, contains exercises which could not be even attempted with a cord robot.

When we supply you with a Valiant turtle to play with and review, perhaps you too will discover the joys of remote control and become a Valiant-lover. In the meantime, perhaps you would be good enough to correct the false impressions given in your highly-respected and informative magazine which on this occasion has failed to please this reader!

**Gillian Manvell**
Valiant

Valiant turtles are free from restrictions of wires and leads

**Apologies to Valiant for suggesting it had gone out of business. The company's address is 370 York Road, London SW18 1SP.**

## STAR TURN

Sir, I was disappointed to discover that neither Valerie Britton's letter (Dec '86) nor that of Mike Turner (March '87) provided the remedy for making my Star printer DP 510 work on the advanced (monthly tape listings) version of the *Calligraphy* program called *ROMA+*, written by Mike Turner himself. I suspect that Mike's ESC '@' code may also have caused problems with other printer models. Depending on the text, the use of PROCswitchon actually inhibited the printing of certain strings of characters when PROCshift was invoked.

However, the following code which gives the printer a zero-width line feed instruction, followed by a carriage return, actually works when the printer dip switch is set to the auto line feed position:

```
1310 VDU 1,27,1,65,1,0,1,13
```

To conform with my printer, which does not have an ESC 'B' code, the following two lines were also changed:

```
260 PROClinespace: VDU 1,13
390 VDU 1,27,1,65,1,8
```

I hope this tip will prove helpful to those who so far have been unable to get their program to run successfully.

**Paul S Drake**
Hampshire

## PRAISE FOR USER DUMP

Sir, I recently purchased *Acorn User*'s *UserDump* ROM. This proved to be an excellent utility, which more than met expectations. However, I have had problems; the ROM was bought to dump out AMX *Super Art* pictures on an Epson JX 80 printer using a BBC B. Not an unreasonable usage you might think! First, the AMX ROM clashes with the *UserDump* ROM and *Super Art* will not install if both are present. Second, the *UserDump* ROM has no special prefix: this means that the command *WINDOW will not work.

I have partially overcome the problem by using a cartridge system. Using the AMX ROM the image may be created or recalled. This must then be saved to disc using **SAVE* picture 3000 +5000 either directly from AMX *Super Art* or for larger images from the AMX library utility (doctored for the purpose). Next, after changing cartridges, the *UserDump* can be used in conjunction with a simple utility program which loads the screen, restores colours used, sets the graphic dump window and dumps the image in colour. This procedure is not as long-winded as it seems and works well for anything up to full screen pictures.

**J Ollivere**
Leicestershire

## EXPERTS ANSWER BACK

Sir, I feel that I must agree with the letter from James Fryer, published in the March issue.

I fully understand the plight of the beginner, to whom a lot of the jargon may be unintelligible, but all the same, beginners become experts with time and practice, and to those who know what the author means when he or she produces a piece of jargon, an explanation provides lengthy reading.

Mr Fryer commends the Advanced User Guide for its concise informative text, and I must agree with him. It is an absolute must for anybody considering learning more about the BBC than the User Guide reveals. It may not help people trying to teach themselves, but I hardly think that it was written for that purpose.

Please remember that it is not just beginners who read your magazine, there are some people who know exactly what the authors mean.

**Fiona Jamieson**
Edinburgh

## INTELLIGENT TALK

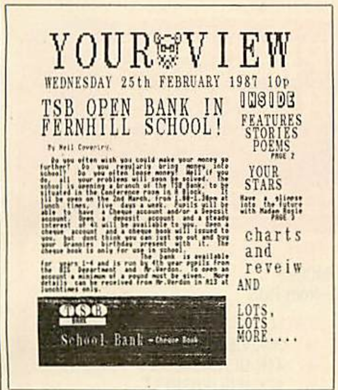
Sir, I found the articles on artificial intelligence in the March issue of the magazine quite fascinating, especially the *Gus* and *Eliza* programs. I found the method of programming most illuminating.

**B J Wood**
Tyne and Wear

## NEWSPAPER LAUNCH

Sir, Please find enclosed a complimentary copy of the latest edition of *Your View*, a fortnightly newspaper published by fourth year pupils at Fernhill School, Hampshire on AMX *Pagemaker*.

The group who publish the newspaper have formed themselves into a company under the auspices of the Mini-Enterprise Scheme, and with the help of a £30 grant from the National Westminster Bank, have bought themselves a set of discs to facilitate the launching of the newspaper.


YOUR VIEW

WEDNESDAY 25th FEBRUARY 1987 10p

TSB OPEN BANK IN FERNHILL SCHOOL!

By Neil Coventry.

Do you often wish you could make your money go further? Do you regularly bring money into school? Do you often loose money? Well if you do, all your problems will soon be solved. The school is opening a branch of the TSB Bank, to be situated in the Conference room in B block. It will be open on the 2nd March, from 1.00-1.30pm at lunch times, five days a week. Pupils will be able to have a Cheque account and/or a Deposit account. Open a deposit account and a steady interest of 4% will be available to you. Open a cheque account and a cheque book will issued to you, but dont think you can just go out and buy your Grannies birthday present with it. The cheque book is only for use in school. The Bank is available for years 1-4 and is run by 4th year pupils from the [illegible] Department and Mr.Verdon. To open an account a minimum of a pound must be given. More details can be received from Mr.Verdon in R13 at lunchtimes only.

TSB School Bank – Cheque Book

INSIDE
FEATURES
STORIES
POEMS
PAGE 2

YOUR STARS
Have a glimpse into the future with Madam Rosie
PAGE 3

charts and reveiw
AND
LOTS, LOTS MORE....

They have produced three editions so far, and circulation is running at approximately 100 per issue.

**Kevin Verdon**
Fernhill School
Hampshire

**Next month is a publishing special – so look out for it! There will be many hints and tips plus pieces of advice.**

## PRINTING POUNDS

Sir, On many occasions I have seen letters in computer magazines from people having difficulty in making their systems print the #, $ and £ signs.

As many people will know, this is due to the different character sets printed by each national version of the ASCII set of codes.

I recently purchased a Brother printer, M-1109. This has twelve national character sets, two of which are called English I and English II. With the English II set selected, the characters printed match all of those on the keyboard of the BBC B computer. What you type on the system is exactly what is printed.

The machine also appears to work with all the standard Epson control codes including graphics, and does NLQ and proportional spacing.

Hopefully this will be of help to anyone who hasn't bought a printer for their model B micro.

**D Fletcher**
Wiltshire

## CASTLE COMMENDED

Sir, My thanks to Mark de Weger and *Castle of Nightmares*. I typed this game in on my Electron but found it unbearably slow to play. So finally I had the Slogger 64k RAM and Turbo fitted.

The improvement is remarkable and the game is now playable although I must confess to a couple of small alterations to the original.

I deleted line 1000 from listing 3 to allow the man to drop down to a platform below without losing a life.

I also deleted all PROCm's from DEFPROCj, lines 310 to 430 in listing 3. This greatly improves the chance of jumping a moving missile.

I am now considering upgrading to disc. I already have the Plus 1 and have seen advertised the Advanced Plus 4, but need a little advice to choose a suitable disc drive and discs as I believe there are now programs being put on 3.5-inch discs for the Electron.

**J R Flynn**
Essex

**We reviewed the ACP Plus 4 in July last year and regard it as the standard disc interface for the Electron. With it you can use either 3.5-inch disc drives or the older 5.25-inch.**

**Which size of disc you go for depends on the software you want to use. BBC material comes on 5.25in discs, but a lot of it won't run on the Electron. Companies are starting to do 3.5in format software, but it will be a long time before the volume matches that for the BBC.**

**On balance, go for 3.5in. The discs are dearer, but they hold more and the drives are cheaper. Only go for 5.25in if BBC compatibility to swap discs with friends is your major consideration.**

## ELECTRON NEWSLETTER

Sir, Calling all Electron owners! I am interested in starting a newsletter/magazine to be circulated among Electron owners free of charge. Anyone interested in helping, contributing or just wanting to receive a copy please contact me at: 4 York Street, Hasland, Chesterfield, Derbyshire S41 0PN.

Readers in other countries are very welcome to participate and write in.

Please send in your ideas, anything welcome, including a name for the publication. All letters will be answered.

**Simon Davison**
Derbyshire

## ERROR PRONE PROGRAMS?

Sir, Whenever I contemplate typing in a moderately lengthy program, I am immediately put off by the fact that there is bound to be an error.

Why is it therefore, that whereas the programs on the monthly tapes never have errors, the listings provided in the yellow pages always do. Is it a cheap ploy to get people to continue to buy the magazine until they find the answer in the Blunderbox? If so this is not worthy of a magazine with such fine contributors.

Do you know of a screen dump for the Seikosha GP-100A II?

**Matthew Bradley**
Oxfordshire

**First, the majority of phone calls and letters we get are from people who have made mistakes typing in listings, rather than there being a problem with the magazine.**

**Errors which creep in are to do with amendments to programs for disc, cassette, Electron, etc, users. These are already made on the disc or cassette as we prepare special versions for each.**

**We provide free checksums to help people debug listings and a copy of the latest blunders comes with these. Send an A4 sae with a 26p stamp to April Checksums, PO Box 641, London NW9 8FT.**

**A Seikosha screen dump was printed in the September 1982 issue of *Acorn User*.**

NEW!

# GENIE Your wish is my command...

**Address Book - Desk Diary — Calculator — Calendar — Phone Book — Notepad.**

**Instantly — at any time — Magic??? No, just call GENIE!**

The Genie System only **£69.00 + VAT** (£79.35 inc. VAT plus £1 carriage)

How often do you interrupt important work on your computer to use a calculator, look up your address book, consult your diary or make a note of something?

Have you ever wished for an invisible helper, just waiting there in the shadows, behind whatever program you are using, ready to appear, as if by magic, whenever needed?

**GENIE — YOUR HELPER, HAS ARRIVED!**

GENIE is a revolutionary new system which puts all your day-to-day information literally at your fingertips.

A single keystroke will call up GENIE, from WITHIN a wordprocessor, spreadsheet or other application software— no need to save your work—GENIE appears instantly on screen.

When finished, another keystroke makes GENIE vanish, immediately dropping you back to EXACTLY what you were doing, before you called GENIE.

GENIE is a totally self-contained system requiring no access to disk, it is present in your computer from the moment you switch on.

**THE SOFTWARE**

The GENIE System software—32K of machine code—has an original screen display, using high resolution windows with up to 7 colours on screen, AND 80 column text display. The screen colours are user selectable to give optimum clarity on any monitor.

GENIE provides; a 10 digit calculator with memory, a 100 year calendar, address book, desk diary, notepad and phone book. Information can be accessed by browsing, or by fast search techniques. The notepad is a mini-wordprocessor with word-wrap, and full cursor editing.

GENIE can produce address labels, and pages of the diary notepad can be output to a printer.

In addition to these, stored in GENIE's memory are ASCII tables and lists of commonly used conversion factors eg metric to imperial units.

All the utilities in GENIE are MENU DRIVEN, making full use of cursor and function keys. There is an ON—SCREEN function key strip at the bottom of the display—NO need to change key strips to use GENIE!

If the information stored in GENIE is confidential, a password lock can be put on, barring access to all of the GENIE utilities.

**THE HARDWARE**

GENIE 'lives' on a small circuit board only 3 inches square.

The GENIE System hardware uses a totally new memory paging technique, developed by PMS, which maps 32K of ROM and 64K of RAM into the address space of a single 16K sideways ROM.

The GENIE board is connected to the computer via a single header on 6 inches of ribbon cable. This header plugs into any ROM socket on the main BBC, MASTER or COMPACT board.

NO flying leads—NO soldering—NO modifications.

The GENIE board can be positioned almost anywhere inside the machine. The ribbon cable is long enough to prevent physical conflicts with other hardware.

The power requirement of GENIE is very low, only slightly more than standard EPROMS, so there are no overheating problems.

## PMS MULTI-FONT NTQ

**Near Text Quality Typesetting Software**

**"Quite simply the best font software available for the BBC"—NTQ users say it—the reviewers agree—**

If you want to produce quality worksheets, newsletters, OHP slides, menus, leaflets, concert programmes and tickets, exam papers, reports, invoices or just add style to your personal letters—NTQ's for you.

Use NTQ with VIEW, WORDWISE, INTERWORD, WORDPOWER* or BASIC on BBC, B, B+, MASTER, COMPACT and even ELECTRON with ANY EPSON compatible printer (MX and FX).

FONT LIBRARY CONTAINS OVER 35 HIGH QUALITY FONTS—standard typefaces + foreign languages + maths/science symbols + fancy styles.

Write or phone for leaflet and full list of fonts.

MIX FONTS, HEIGHTS, WIDTHS AND PITCHES IN ONE LINE OF TEXT-just like this:

MULTI-HEIGHT MULTI-WIDTH
MULTI-FONT MULTI-PITCH
BACKGROUNDS INVERSE
AóÄÆÇÈâòôùõlè α±÷×√≑≡≠~≃≈♩♪

**Other features:**

MICRO-JUSTIFICATION—right and left justified proportionally spaced text.

DRAFT mode—for a fast, rough copy for proof reading, but showing ALL NTQ features.

The basic NTQ system consists of a 2 ROM set—one ROM containing the NTQ driver software, and 3 fonts, the other containing a further 4 fonts. Any number of FONT EXTENSION ROMs can be added to the system, each one containing any 4 fonts of the user's choice selected from the FONT LIBRARY. Users can create their own fonts using the FONT DEFINER program supplied on the utilities disk. These fonts can be loaded into sideways RAM or burnt into ROM.

**NTQ costs ONLY £34** (including VAT) plus £1 post and packing.

Please state disk size (5.25"/3.5") and printer type when ordering. For details of our Educational Site Licensing and Bulk Purchase agreements phone our Sales Office.

*"Despite its power NTQ is a very easy package to use"* (Educational Computing).

*"The quality of text is quite outstanding"* (TUBELINK).

*Also available: Power Font NTQ—a special version of NTQ for Ian Copestake's WORDPOWER word processor. This combines on-screen foreign/maths symbols with NTQ printout—a MUST for serious writers. (Phone 04867 4755 for info.).

## A 6502 SECOND PROCESSOR AT AN AFFORDABLE PRICE!

### PMS B2P-6502

### THE SUB-£100 SECOND PROCESSOR

**BANISH "Bad Mode" MESSAGES**
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- ★ 44K in HiBASIC—from PMS

**WIDEN WORD PROCESSING STORAGE**
- ★ 30K VIEW 2—80 column display
- ★ 47K VIEW 3 and HiVIEW
- ★ 42K HiWORDWISE PLUS—from PMS

**SWELL SPREAD SHEET SIZES**
- ★ 30K VIEWSHEET—MODE 0
- ★ 44K ULTRACALC 2
- ★ 42K HiINTERSHEET

The B2P is fitted with a CMOS65C02 processor and works with both SINGLE and DOUBLE density DFS's. The "BOS" ROM, supplied with the B2P, contains the B2P Operating System + TUBE Toolkit — 65C02 disassembler, B2P memory editor, memory shifters, printer buffer.

The B2P runs software obeying the ACORN TUBE protocols, this includes BASIC, the whole VIEW family, PASCAL, COMAL, LISP, BITSTIK etc. . .

The B2P is only 5.5" × 4" — external to the BBC — can be fitted internally if desired.

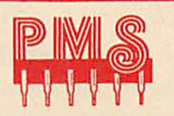
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# HINTS & TIPS

**Martin Phillips guides us through setting up *Wordwise +*, dumping perfect circles and space bar functions**

**£5**

## EXTENDING SPACE BAR FUNCTIONS

Mr B H Beeston from Enfield wins £5 for a useful tip to allow the space bar to print more than one symbol. Many keys on the keyboard have three functions depending on whether the key is pressed alone or in conjunction with Shift or CTRL. For instance pressing CTRL and the L key will give a control code 12 which clears the screen. Shift and L gives a capital L, while pressing L on its own gives a lower case l. Note that when the Caps Lock is on this has the same effect as Shift-L.

Some keys, however, do not respond in this way; the space bar being one. Mr Beeston has found a simple but effective way of making the space bar give up to three further symbols. The following line of Basic illustrates the technique:

6%=GET: IF INKEY-1 AND G%=32 THEN...

INKEY-1 will respond with true (−1) if the Shift key is pressed at that instant. Therefore the line first waits for a key to be pressed, and then tests to see if the Shift key is being pressed. If it is then some action can be taken.

Listing 1 on the yellow pages demonstrates this. It also makes use of the CTRL key which uses INKEY-2. When the space bar is used on its own a space is printed, but when Shift-Space is used a white square is printed, while CTRL-Space prints a diamond. The diamond and square are defined at lines 70 and 80.

Finally Mr Beeston gives another short hint which he has included in listing 1. Large numbers in VDU statements can be simplified by using negative numbers. Thus −1 is the same as 225, −2 the same as 254 and so on. Clearly beyond −9 there is no saving in space. Also '255, 255' can be further reduced to '−1;'.

## SETTING UP WORDWISE +

Normally before loading *Wordwise +*, I load a set of function key definitions. Often I load a segment with my address. There are several other segments which I occasionally load too. One of the most useful of these is an 'unformatter'. This removes spaces, and Returns. It also removes pesky pad and *SPOOL characters produced after spooling a program and loading into *Wordwise*.

It occurred to me that I could put these into *Wordwise* automatically and call them up at will. Such a routine is only practical with disc drives. This I did with some trouble, then I started to refine it and add a few extra features. First, I put the function key definitions into a segment, which meant they could be altered at any time. Such codes as the temporary indent command could then be changed for special occasions. Later, I discovered that it was rather difficult to remember what was in each of the segments, so segment 0 became the help key.

First create a !BOOT file, see figure 1. This can be done from *Wordwise +*, and simply saved (a useful hint!). Do be careful to put a Return where marked, and do not insert any spaces or Returns elsewhere. There is no Return between the *KEY0 and the *WORD. On the editing screen of *Wordwise* it should appear exactly as below. Save it as normal using option one of the *Wordwise +* menu. It must be saved as !BOOT.

```
*KEY 0
*WORD.|M*FX3,14|M:S.SE.0
|M:LO.TE."Z.0"|M:S.SE.1|
M:LO.TE."Z.1"|M:S.SE.2|M
:LO.TE."Z.2"|M:S.SE.3|M:
LO.TE."Z.3"|M:S.SE.4|M:L
O.TE."Z.4"|M:S.SE.5|M:LO
.TE."Z.5"|M:S.SE.6|M:LO.
TE."Z.6"|M:S.SE.7|M:LO.T
E."Z.7"|M:S.TE.|M*FX3|M|
M
*FX138 0 192
```

**Figure 1. ! BOOT File for *Wordwise +***

This boot file was rather tricky. Each line can only be 255 characters long. The function key definition was the problem. For each of the eight segments the following is entered:

> SELECT SEGMENT 0
> LOAD TEXT "Z.0"
>
> SELECT SEGMENT 1
> LOAD TEXT "Z.1"
>
> SELECT...
> and so on

Thus each segment in turn is selected, and then the appropriate file loaded in. Finally, the normal text mode is selected. Clearly you can't enter many segments this way. However, I discovered that *Wordwise +* commands can be shortened using the abbreviations as shown in the box below:

> SELECT becomes S.
> SEGMENT becomes SE.
> LOAD becomes LO.
> TEXT becomes TE.

*WORD. has been used instead of *W. so that users with BBC Master micro will not have any problems. These abbreviations make a considerable difference, and eight segments can be defined; enough for most purposes. Finally the *FX3,14 switches off the screen to save all the commands appearing on the screen. *FX3 cancels this and returns the screen back to normal.

Once the function key has been defined it is called up. Then *Wordwise* is entered, and each of the segments is loaded in turn. Obviously your disc should contain all the files listed. In my case I have labelled them 0 to 8 and save them in directory Z, thus they are saved as Z.0, Z.1 and so on. Then when the disc is catalogued, these are tucked out of the way at the bottom. Some of the segments I have used are shown in the figures is this article.

```
REM Segment 0
PRINT
PRINT" f1 ... Character remover"
PRINT" f2 ... Address"
PRINT" f3 ... Key definitions"
PRINT" f4 ... Standard heading"
PRINT" f5 ... Spare"
PRINT" f6 ... Spare"
PRINT" f7 ... Spare"
PRINT" Press any key";
A%=GET
```

**Figure 2. *Wordwise +* segment 0**

Segment 0 (figure 2) provides the help function. When this segment is selected, all the options will be shown. Obviously the text should be altered to suit.

```
REM Segment 1
PRINT
PRINT "Remove Pad Characters? ";
PROCgetkey
IF A$="Y" THEN PROCpad

PRINT "Remove SPOOL characters? ";
PROCgetkey
IF A$="Y" THEN PROCspool

PRINT "Remove RETURNs? ";
PROCgetkey
IF A$="Y" THEN PROCret

PRINT "Remove spaces? ";
```

**continued ▶**

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Ac. U. 5/87

```
PROCgetkey
IF A$="Y" THEN PROCspace
END

.getkey
A$=CHR$(GET AND 95)
PRINT A$
ENDPROC

.pad
SELECT TEXT
CURSOR TOP
REPEAT
REPLACE CHR$124,CHR$0
UNTIL EOT

.spool
CURSOR TOP
REPEAT
REPLACE ">L.",CHR$0
UNTIL EOT
CURSOR TOP
REPEAT
REPLACE ">*SPOOL",CHR$0
UNTIL EOT
ENDPROC

.ret
CURSOR TOP
REPEAT
REPLACE CHR$13,CHR$0
UNTIL EOT
ENDPROC

.space
DELETE MARKERS
CURSOR TOP
REPEAT
REPLACE "  "," "
UNTIL EOT
ENDPROC
```

**Figure 3. *Wordwise +* segment 1**

Segment 1 (figure 3) is used when I want to use listings in *Wordwise*. When listings are spooled and then loaded into *Wordwise +*, a number of pad characters are printed. These do not do any harm, they are just a bit annoying. Also '> L.' (I always use L. instead of LIST) appears at the start, and '> *SPOOL' appears at the end. Then for the sake of completeness, I have included two routines to remove surplus spaces and Return characters. These often occur when putting text in which was not created on *Wordwise*. These routines can be extended or altered as you want.

Segment 2 (figure 4) can be used to hold an

```
REM Segment 2
A$=CHR$13
TYPE"Acorn User"
TYPE A$
TYPE"Redwood Publishing"
TYPE A$
TYPE"141-143 Drury Lane"
TYPE A$
TYPE"London"
TYPE A$
TYPE"WC2B 5TF"
TYPE A$
TYPE A$
TYPE"Tel. 01-836 2441"
TYPE A$
TYPE A$
DISPLAY
```

**Figure 4. *Wordwise +* segment 2**

address for letters. It is called up by pressing Shift and function key f2, either from the menu page or from the editing page. The address will be printed at the current cursor position. Similar segments could be included for other standard messages.

The A$ contains the Return character, as the TYPE command does not work in the same way as Basic's PRINT command which puts a Return at the end of the line. Without the A$ all the text would be printed on one line. The DISPLAY command at the end is needed to show the new text, otherwise it does not appear until a key is pressed.

```
REM Segment 3
REM configure for Citizen 120D

REM underline on
*KEY0 !!!OC27,45,1!!"

REM underline off
*KEY1 !!!OC27,45,0!!"

REM emphasise on
*KEY2 !!!OC27,69!!"

REM emphasise off
*KEY3 !!!OC27,70!!"

REM US character set
*KEY4 !!!OC27,82,0!!"

REM UK character set
*KEY5 !!!OC27,82,3!!"

REM reverse on
*KEY6 !!!OC27,114!!"

REM reverse off
*KEY7 !!!OC27,116!!"

REM temp indent 5
*KEY8 !!!TI5!!"

REM temp indent 10
*KEY9 !!!TI10!!"

PRINT
PRINT
PRINT" function keys installed"
PRINT
PRINT" press any key";
A%=GET
```

**Figure 5. *Wordwise +* segment 3**

Segment 3 (figure 5) programs the function keys. This can easily be tailored to suit your most used *Wordwise* commands. When it has loaded, a message confirms the keys have been installed. The codes can be inserted in text by pressing both Shift and Control together and the appropriate function key. I have not used the 'ES' code as I find it does not always work, and the underline code I have put in in full, to make it easier to change to some other code if so required.

The beauty of this part is that I can simply enter the segment and change the codes to suit a particular piece. Then it can be called up.

There are other ways of saving the information besides segment 4, but this is easy to alter for any particular purpose. Indeed you, could include a selection option to call up any one of several standard headings, each in its own procedure.

For the spare segments I simply put the following into each segment and save just the following heading:

REM segment 5

Using these segments is simplicity itself. Call up the appropriate segment by pressing Shift and the function key.

Finally, to install the whole thing on a disc, make sure that the !BOOT file has been saved, and so have segments zero to seven. These should have been saved as Z.0 to Z.7. Finally type in:

*OPT 4, 3

to enable the disc to auto-boot, then pressing Shift-Break will load the disc. If there are problems and nothing appears to have loaded, then carefully check the !BOOT file. It can be loaded back into *Wordwise +*.

A check through each segment will reveal which have loaded. Any mistakes made when entering the segments are highlighted when run and are easily cured. Segment 3 should only have one set of quotation marks in each definition – it is not a printing error!

## £10
## ROUND SCREEN DUMPS

In last September's issue, part of the Hints & Tips article covered screen dumps. Judging by the flood of mail since, this has caused considerable interest. Some confusion was caused because the line numbers in the listing were altered but those in the text were not. Also, the line by line explanation of the listing referred to the original listings and not the ones printed. Sorry.

Most of the letters have requested help in one of four areas. First, how to dump just part of the screen. Second, producing a full-page dump. Third, how to make the changes specified in the text which referred to different line numbers, and fourth, the true circular screen dumps. All these points cannot be covered at once, so this month I shall reprint the two machine code listings, to agree with the line numbers given in September.

In September, the listings printed did not tally with the line numbers given in the explanation; the reprinted listings now agree with the description given in September. I shall also show again how they can be altered to give so-called proportional screen dumps (they give proper round circles) on an Epson or Citizen 120D printer.

The first screen dump is tailored for modes 1, 2, 4 and 5, the second for mode 0. Do also refer to the September 1986 issue, page 50 onwards. Also many thanks to all those readers

# MORLEY ELECTRONICS

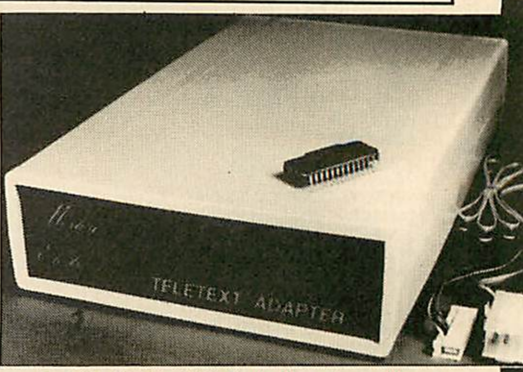
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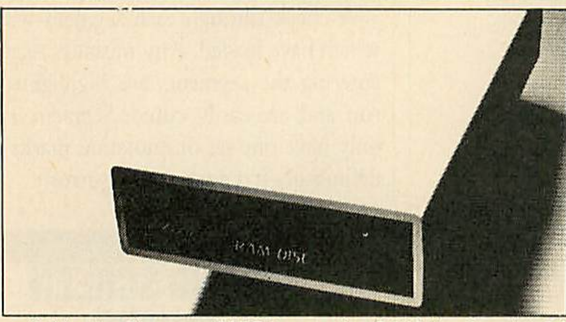
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who have written in. Future Hints & Tips will provide all the answers.

To use one of the machine code dumps in your own programs, type in the listing and save it. After testing the routine, the machine code part can be saved separately: run the program and, when it is finished, type:

```
*SAVE SDUMP 900 +FF
```

and the machine code part will be saved in a file called SDUMP. To use this in your own programs, you can include a line like this:

```
50 *LOAD SDUMP
```

and then:

```
100 CALL &900
```

when the screen dump is required. Obviously, this line should be inserted at the point in the program when the drawing is complete. Disc users can use:

```
100 *SDUMP
```

as an alternative, as this both loads and runs the machine code.

Listings 2 and 3 on the yellow pages provide the machine code dumps. They relate to the Basic screen dumps, listings 3 and 4 in the September 1986 issue. These screen dumps do not produce round circles. The reason for this is that printers print with a vertical spacing of 72 dots to the inch, and a horizontal spacing of 60 dots to the inch. Thus the circles appear as ellipses. Some printers now include another graphics command. This is the ESC'*' code, which will allow several graphics variations. Epson printers have seven variations, some printers, the Citizen 120D included, have eight. This code, with a parameter of five, allows graphics with 72 dots to the inch to be produced, thereby offering true circles. The changes that need to be made to listing 2 are:

```
380 LDA #27:JSR printer: LDA #42: JSR printer: LDA #5: JSR printer
```

For those who have a printer like the Citizen 120D which has eight variations, the last one will produce a dual-density proportional screen dump. This can then be used with the mode 0 screen dump. The following changes need to be made to listing 3.

```
380 LDA #27:JSR printer: LDA #42: JSR printer: LDA #7:JSR printer
```

Do note that this latter option will not work on many printers.

*The problems* with listings 2 and 3, and most other screen dumps, is that the vertical and horizontal scales are different. What appears as a circle on screen is printed as an oval on paper. Proportional screen dumps print with the same verticle and horizontal scale, so circles are truly round. This sort of facility is vital for any drawing or painting program.

The modification of listing 2 given above makes it possible to print proportional dumps in modes 1, 2, 4 and 5. But what about mode 0?

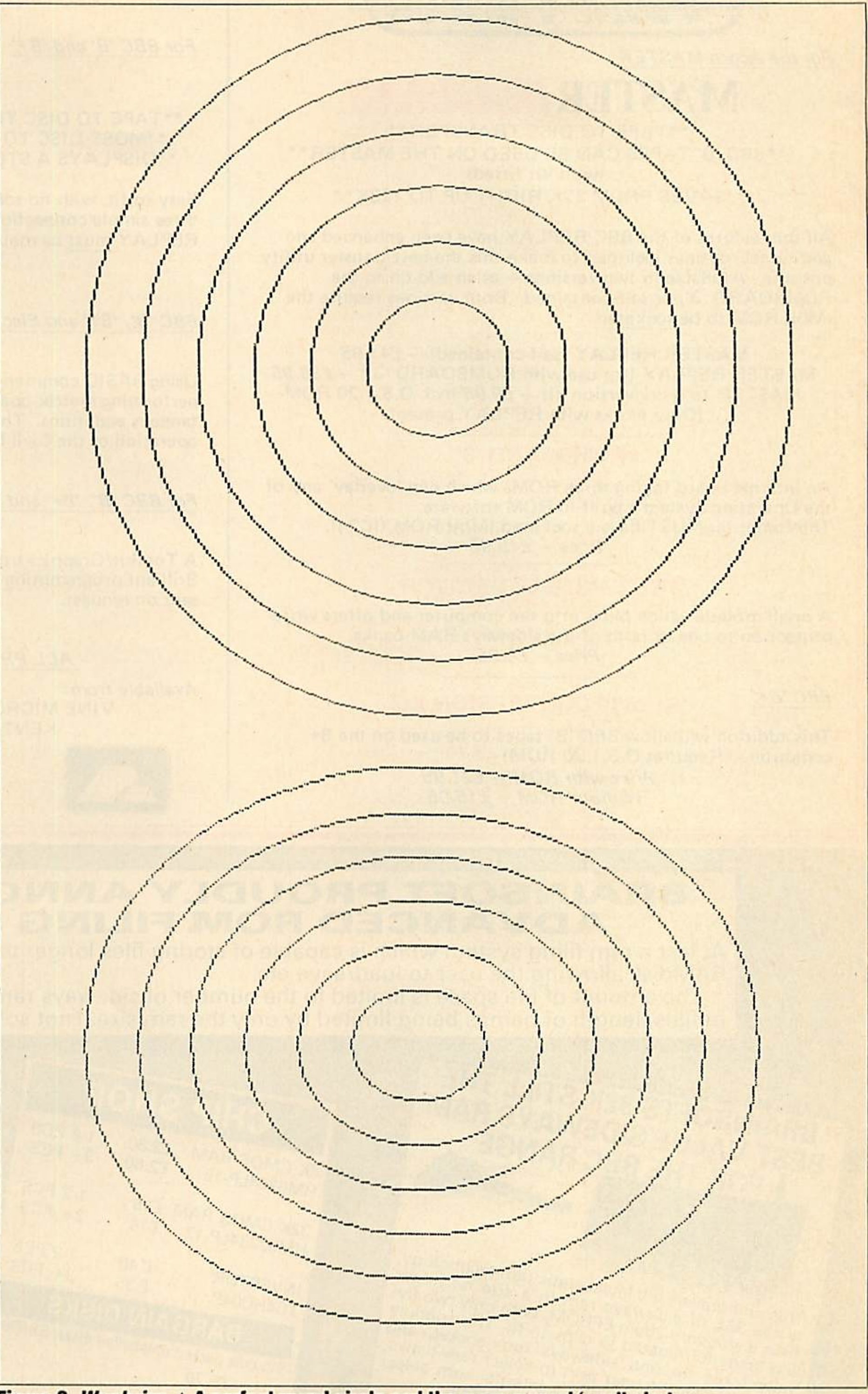


**Figure 6. *Wordwise* + A perfect round circle and the more normal 'oval' circle**

Mr M A Jeffree from Oxford has sent in a useful variation on the screen dump (see listing 4). It will give a full-screen proportional screen dump. This dump uses the ESC '*' graphics print mode of a printer with the mode set to 5 Many modern printers now have this feature. To dump this screen it has to print the picture on its side. Such screen dumps will only fit this way round, as the dot column width of most printers in proportional mode is 576 dots, and the screen dots are 640 wide by 512 up. The normal printer graphics mode (ESC 'K') will only print 480 dots wide, so this will not work at all.

This dump is the same for all graphics modes, another useful bonus, although it is somewhat slower than listing 2. A well deserved £10 goes to Mr Jeffree.

A final point on the note of screen dumps. The graphics origin must be set at 0,0 to produce a full screen graphics dump. Otherwise the dump will include areas that are off the screen. These will be printed in black.

# FIRST BYTE

## ASSEMBLY TIME

**We put the theory into practice and convert Basic into assembler**

*Tessie Revivis*

If you've followed this series on assembler since August last year, you should have developed a degree of machine code programming expertise, and so we can set about converting a few simple Basic programs into assembler. This is not as hard as it may seem, because many BBC Basic commands have a direct equivalent in assembler. The operating system (OS) in all the Acorn micros is responsible for the everyday task of runnning the machine. This includes 'reading' the keyboard to detect key-presses and printing text and graphics on the screen. The August edition of First Byte showed how to read a key from the keyboard (using OSRDCH) and print a character to the screen (OSASCI).

Basic loops such as FOR... NEXT are easy to implement using the branch instructions such as BEQ and JMP with counters and count commands such as INX and INY. Again we have already examined these. However, we have not looked at simple machine code graphics, so let's do that now, and in particular how we can perform the following Basic commands: MODE, MOVE, DRAW and PLOT in machine code.

Graphics are handled by what is known as the VDU driver. VDU is a generic computer term that stands for visual display unit. Driver is the program, in this case a section of the OS, which is responsible for making things appear on the screen. All big programs (certainly every one that I can think of) require text and/or graphics to be displayed, so the VDU driver must be accessible to them. Just like reading the keyboard and printing a character, there is a special OS call – OSWRCH (Operating System Write Character). This is accessed with a subroutine jump to the address &FFEE, thus:

JSR &FFEE

To use this call, an action code number must be placed into the accumulator before performing the jump. The VDU code summary in your User Guide will list the options, and as you will see every Basic graphics command can be emulated including MODE, PLOT, MOVE, DRAW, COLOUR and GCOL. Commands such as these need extra information which must also be sent by loading each item of data in turn into the accumulator and then sending it to the VDU driver which the JSR &FFEE call. Because an action code has already been sent to the OS, it will be waiting for this extra information. Let's try a few simple examples for each.

```
 10 REM Simulating MODE
 20 DIM code% 50
 30 P% = code%
 40 [
 50 PHA
 60 LDA #22
 70 JSR &FFEE
 80 PLA
 90 JSR &FFEE
100 RTS
110 ]
120 A% = 4 : REM Mode number
130 CALL code%
```

**Listing 1. Demonstrates a mode change**

### MODE

The action code for MODE is 22. However one extra byte of information is required, which is of course the mode number. To select mode 3 for example, four lines of assembler are required:

```
LDA #22
JSR &FFEE
LDA #3
JSR &FFEE
```

Listing 1 demonstrates this mode change using the integer variable A% to pass the mode number, in this case four, into the machine code, and then keeping it stored temporarily on the hardware stack.

Hopefully this will be straightforward to follow. If you have programmed to a reasonable degree in Basic, you may have recognised that the action code 22 can also be used with the Basic VDU command. In fact the VDU command uses OSWRCH and so the above mode change can be performed using the Basic line:

VDU 22,3

### MOVE and DRAW

Emulating the MOVE and DRAW commands is as easy. In the DRAW case there

```
 10 REM Simulating MOV
E and DRAW
 20 DIM code% 100
 30 P% = code%
 40 [
 50 LDA #22
 60 JSR &FFEE
 70 LDA #4
 80 JSR &FFEE
 90 LDA #25
100 JSR &FFEE
110 LDA #4
120 JSR &FFEE
130 LDA #244
140 JSR &FFEE
150 LDA #1
160 JSR &FFEE
170 LDA #188
180 JSR &FFEE
190 LDA #1
200 JSR &FFEE
210 LDA #25
220 JSR &FFEE
230 LDA #6
240 JSR &FFEE
250 LDA #0
260 JSR &FFEE
270 JSR &FFEE
280 JSR &FFEE
290 JSR &FFEE
300 RTS
310 ]
320 CALL code%
```

**Listing 2. Using MOVE and DRAW commands**

are two action codes, 25 followed by a six and this in turn must be followed by two other items of information – the X and Y co-ordinates of the position to be moved or drawn to, ie, DRAW X,Y. The range of X and Y is 1279 and 1024 respectively but a single byte can only hold a number in the

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range zero to 255, so we have to convert the X and Y values into two-byte numbers – this is done by using DIV and MOD as follows. Suppose we wish to perform the machine code equivalent of:

DRAW 500,700

We simply PRINT the MOD and DIV of each value, thus:

PRINT 500 MOD 256
PRINT 500 DIV 256
PRINT 700 MOD 256
PRINT 700 DIV 256

The value returned in each case will be:

244
1
188
2

and it is these (and in this order) which we must send to OSWRCH. In Basic using the VDU command it is:

VDU 25,6,244,1,188,2

In assembler this translates to :

```
LDA #25
JSR &FFEE
LDA #6
JSR &FFEE
LDA #244
JSR &FFEE
LDA #1
JSR &FFEE
LDA #188
JSR &FFEE
LDA #2
JSR &FFEE
```

The above segment of code can be incorporated into an assembler program and you might like to try this before reading on.

MOVE also has two action codes – 25 and 4, and its use is identical to that of DRAW. Listing 2 uses both MOVE and DRAW to perform the Basic equivalent of:

```
10 MODE 4
20 MODE 500,700
30 DRAW 0,0
```

which in VDU commands translates into:

VDU 22,4
VDU 25,4,244,1,188,2
VDU 25,6,0,0,0,0

## PLOT

The PLOT command is the most versatile of the graphics commands and is of use because it can also perform MOVE and DRAW – full details can be found in your micro's User Guide. The action code to emulate PLOT is 25. This is followed by the correct PLOT code number which in turn is followed by the four bytes' coordinates. In Basic, the PLOT 85 command can be used to draw and fill a triangle using the last two positions of the graphics cursor (set by MOVE for example) as two of a triangle's three corners. The following Basic program draws and fills a triangle in mode 5:

```
10 MODE 5
20 MOVE 100,100
30 MOVE 500,100
40 PLOT 85,500,500
```

Using VDU commands this simplifies to:

```
10 VDU 22,5
20 VDU 25,4,100,0,100,0
30 VDU 25,4,244,1,100,0
40 VDU 25,85,244,1,244,1
```

Making the final translation of these VDU codes is easy enough but would involve a rather long, albeit simple, assembly program. One of the great strengths of BBC Basic is the ability to mix Basic and assembler together. So by placing the VDU codes in data statements and employing a FOR... NEXT loop the program becomes very much easier to write, as shown in listing 3. The main FOR... NEXT loop is held in lines 40 to 100. The VDU data is held in data statements at the end of the program, and this information is identical to that given for the previous VDU-based program. Each byte of data is read in turn into the variable byte%. The assembler is entered (line 60) and immediate addressing is used to load the value held in byte% into the accumulator (line 70), before sending it to OSWRCH (line 80), at which point the assembler is closed. The next byte is then read. Once all the data has been read the machine code must have an RTS assembled on its end to return control, so this is done in line 120.

```
10 REM Simulating PLOT
20 DIM code% 100
30 P% = code%
40 FOR loop% = 1 TO 20
50 READ byte%
60 [
70 LDA #byte%
80 JSR &FFEE
90 ]
100 NEXT loop%
110 [
120 RTS
130 ]
140 CALL code%
150 END
160 :
170 DATA 22,5
180 DATA 25,4,100,0,100,0
190 DATA 25,4,244,1,100,0
200 DATA 25,85,244,1,244,1
```

**Listing 3. Using a FOR . . . NEXT loop**

## The Basic Loop

Listing 4 shows a simple loop and point plot program written in Basic. Enter and run this – as you will see it selects a mode 5 screen and then plots 256 points in the bottom left-hand corner using a counter.

```
10 REM Basic PLOT 69
20 MODE 5
30 X% = 0 : Y% = 0
40 FOR N% = 0 TO 255
50 PLOT 69,X%,Y%
60 X% = X%+1
70 Y% = Y%+1
80 NEXT N%
```

**Listing 4. A simple loop and point program**

To perform PLOT 69 we simply apply the rules we've learnt so far. The 256 loop counter can be implemented using index register X to count from zero to 255 using the zero flag as the loop control flag. Four memory locations in zero page (&70 to &73) are used to contain the VDU point plot bytes. The whole program is shown in listing 5. As a final exercise you might like to try to modify this to continue the line across the screen. To do this you will need to increment the second byte in each variable (at x+1 and y+1) by 12 each time the main loop completes.

```
10 REM Simulating PLOT 69
20 DIM code% 100
30 x = &70
40 y = &72
50 !x = 0
60 FOR pass = 0 TO 3 STEP 3
70 P% = code%
80 [
90 LDA #22
100 JSR &FFEE
110 LDA #5
120 JSR &FFEE
130 LDX #0
140 .loop
150 STX x
160 STX y
170 LDA #25
180 JSR &FFEE
190 LDA #69
200 JSR &FFEE
210 LDA x
220 JSR &FFEE
230 LDA x+1
240 JSR &FFEE
250 LDA y
260 JSR &FFEE
270 LDA y+1
280 JSR &FFEE
290 INX
300 BNE loop
310 RTS
320 ]
330 NEXT pass
340 CALL code%
```

**Listing 5. The completed program**









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A very clever idea from the West Midlands: an AMX *Super Art* accelerator from T J Powell of Sutton Coldfield. This program allows you to produce an AMX *Super Art* file containing a page full of graphics, using a Basic program. It's much faster to create graphics with lots of straight lines or grids this way, as it limits the amount of movement calculation required of *Super Art*. The utility really starts performing when you are creating A4 size graphs. The sample I was sent (a fancy bar chart) took 20 minutes to create instead of about three hours using *Super Art* alone.

Listing 1 (below) is the generic form of the program. Lines 70 and 80 contain the page size in dots, and PROCline(x,y,x1,y1) draws a line between x,y and x1,y1 checking for page boundary. It produces a file 'P.PICTURE', which can later be used by *Super Art*.

Listing 2 is a complete demo that produces a bar chart on A4, taking about 11 minutes. After this, *Super Art* can be used to rapidly fill and colour the graphics, and add the text.

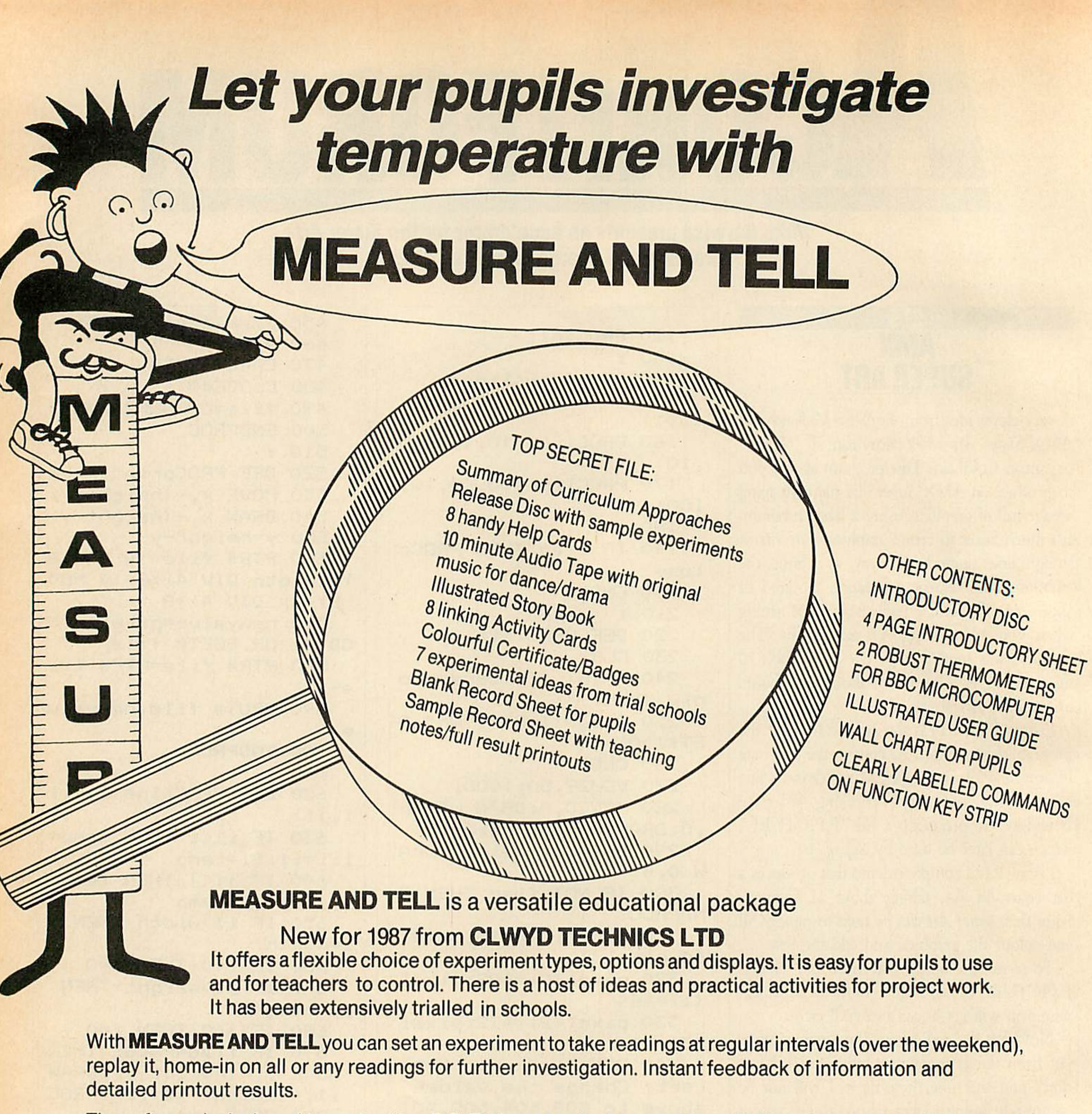
To re-run the utility you must first *WIPE P.PICTURE or use a different filename, otherwise you will get a 'can't extend' error.

Now for the sad news: I'm signing off at last from the Forum (after two years!). I just don't find the time these days. I will not be completely losing touch: I hope to see you at the shows each year. The sweetener is that you will be in good hands. I'm handing over to David Atherton (late of BBC Soft) so you are assured a lively and interesting column.

Bye now, and keep hacking.

```
   10 REM Lines/grids in
 Super Art
   20 REM by Tim Powell
   30 REM for BBC B/B+/M
 and AMX Super Art
   40 REM (C) Acorn User
 May 1987
   50 :
   60 ON ERROR GOTO 890
   70 width=256
   80 height=184
   90 name$="P.PICTURE"
  100 :
  110 MODE 0
  120 PROCinit
  130 :
  140 REM Draw lines
  150 REM PROCline(x,y,x
1,y1)
  160 PROCline(10,10,100
,10)
  170 PROCline(10,10,10,
100)
  180 :
  190 IF flag THEN PROCc
lose
  200 END
  210 :
  220 DEF PROCinit
  230 CLS
  240 PRINT "To screen o
nly (Y/N) ";
  250 flag=(INSTR("Nn",G
ET$)>0)
  260 CLS
  270 VDU29,50;1000;
  280 MOVE0,0:DRAW width
,0:DRAW width,-height
  290 DRAW 0,-height:DRA
W 0,0
  300 IF NOT flag THEN E
NDPROC
  310 DIM block 16,name
64,pixel(3)
  320 pixel(0)=&88:pixel
(1)=&44
  330 pixel(2)=&22:pixel
(3)=&11
  340 REM Black has been
 set. Change the values
above to &08,&04,&02,&01
 for red and &80,&40,&20
,&10 for green. Colours
only seen within Super A
rt.
  350 length=((height*2)
 DIV &10)*width*2
  360 file=OPENOUT(name$
)
  370 PTR# file=length
  380 !block=name:block?
2=&F
  390 block?3=2:block?4=
0
  400 block?5=0:block?6=
height/8
  410 block?7=width/8:bl
ock!8=0
  420 block!12=0:block!&
E=3
  430 $name=name$+CHR$13
  440 X%=block MOD 256
  450 Y%=block DIV 256
  460 A%=1
  470 CALL &FFDD
  480 CLOSE#0
  490 file=OPENUP(name$)
  500 ENDPROC
  510 :
  520 DEF PROCprint(x,y)
  530 MOVE x,-(height-y)
  540 DRAW x,-(height-y)
  550 y=height-y
  560 PTR# file=(y DIV 8
)*(width DIV 4)*8+(y MOD
 8)+(x DIV 4)*8
  570 newvalue=pixel(x M
OD 4) OR BGET# file
  580 PTR# file=PTR# fil
e-1
  590 BPUT# file,newvalu
e
  600 ENDPROC
  610 :
  620 DEF PROCline(i,j,i
1,j1)
  630 IF i1<i THEN temp=
i:i=i1:i1=temp
  640 IF j1<j THEN temp=
j:j=j1:j1=temp
  650 IF i1>width THEN i
1=width
  660 IF i<0 THEN i=0
  670 IF j1>height THEN
j1=height
  680 IF j<0 THEN j=0
  690 IF flag=FALSE THEN
 MOVE i,-(height-j):DRAW
 i1,-(height-j1):ENDPROC
  700 PROCprint(i,j)
  710 IF ABS(j1-j)>ABS(i
1-i) THEN GOTO 770
  720 IF i=i1 THEN ENDPR
OC
  730 FOR a=i+1 TO i1
  740 PROCprint(a,j+INT(
(a-i)*(j1-j)/(i1-i)+.5))
  750 NEXT a
  760 ENDPROC
  770 IF j=j1 THEN ENDPR
OC
  780 FOR a=j+1 TO j1
  790 PROCprint(i+INT((a
-j)*(i1-i)/(j1-j)+.5),a)
  800 NEXT a
  810 ENDPROC
  820 :
  830 DEF PROCclose
  840 PTR# file=length
  850 CLOSE# file
```

continued ▶




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◀ continued

```
860 PRINT TAB(0,30); name$; " now ready for use in Super Art"
870 ENDPROC
880 :
890 CLOSE#0:REPORT:PRINT" at line ";ERL:END
```

**Listing 1. Grids in *Super Art***

```
70 width=480
80 height=768
90 name$="P.PICTURE"
91 ymax=70
92 xmax=14
93 yspare=69
94 xspare=53
95 yscale=9
96 xscale=28
97 xgrad=1
98 ygrad=5
99 nobars=14
101 REM data for heights of bars
102 DATA 62,10,60,69,8,44,28,7,1,4,9,1,4,20,10
103 :
150 PROCline(xspare,yspare,xspare+xmax*xscale,yspare)
151 PROCline(xspare,yspare,xspare,yspare+ymax*yscale)
160 FOR X%=0 TO ymax STEP ygrad
161 PROCline(xspare-5,yspare+X%*yscale,xspare,yspare+X%*yscale)
162 NEXT X%
170 FOR X%=0 TO xmax STEP xgrad
171 PROCline(xspare+X%*xscale,yspare,xspare+X%*xscale,yspare-5)
172 NEXT X%
173 FOR U%=0 TO nobars-1
174 READ V
175 IF V>0 THEN PROCbar(U%,V)
176 NEXT U%
900 :
910 DEF PROCbar(num,top)
920 PROCline(xspare+num*xscale,yspare+top*yscale,xspare+num*xscale,yspare)
930 PROCline(xspare+num*xscale,yspare+top*yscale,xspare+num*xscale+xscale,yspare+top*yscale)
940 PROCline(xspare+num*xscale+xscale,yspare+top*yscale,xspare+num*xscale+xscale,yspare)
950 ENDPROC
```

**Listing 2. Add these lines for bar chart demo**

£10

## THE BIG CLOCK

The listing below is quite useful, using the Master's clock to display a large mode 0 digital clock, giving a rolling display of hours, minutes and seconds.

The program will work on a Compact though it will only display a single time (23:59:59) as this is what TIME$ is permanently set to. If your Compact uses a network, the net clock will be read and this will be used, though the resolution will be limited to the minute only.

The data statements in PROCchars redefine the character set for the numerals to make them easier to read.

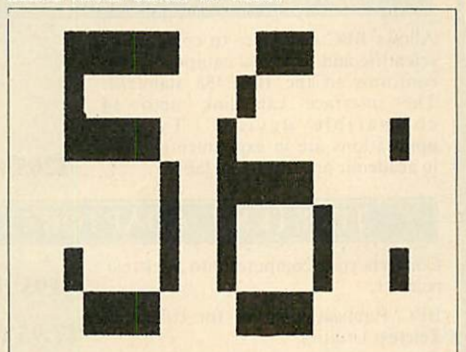



**Figure 1. Jumbo-sized clock characters**

```
10 REM Bigclock
20 REM by David Lawrence
30 REM For Master/Compact & Net
40 REM (c) Acorn User May 1987
50 :
60 MODE 0:VDU 23,1,0;0;0;0;
70 PROCchars
80 PROCcode
90 PROCclock
100 END
110 :
120 DEF PROCchars
130 DATA 60,66,66,66,66,66,60,0
140 DATA 8,24,8,8,8,8,62,0
150 DATA 60,66,4,8,16,32,126,0
160 DATA 60,66,2,28,2,66,60,0
170 DATA 12,20,36,68,126,4,4,0
180 DATA 126,64,124,2,2,66,60,0
190 DATA 28,32,64,124,66,66,60,0
200 DATA 126,2,4,8,16,16,16,0
210 DATA 60,66,66,60,66,66,60,0
220 DATA 60,66,66,62,2,4,56,0
230 DATA 0,0,32,0,0,32,0,0
240 FOR I%=ASC"0"TOASC":":VDU 23,I%
250 FOR J%=1TO8:READ A%:VDU A%
260 NEXT:NEXT
270 ENDPROC
280 :
290 DEF PROCcode
300 ex=&70:block=&9F0:bit=&71
310 FOR I%=0 TO 2 STEP 2:P%=&900
320 [OPT I%
330 .bigchar
340 STA block
350 STX ex
360 LDX #block MOD 256
370 LDY #block DIV 256
380 LDA #&A
390 JSR &FFF1
400 LDX #1
410 .lineloop
420 LDA #31
430 JSR &FFEE
440 LDA ex
450 JSR &FFEE
460 TXA
470 CLC
480 ADC #4
490 JSR &FFEE
500 LDA #128
510 STA bit
520 .bitloop
530 LDY #255
540 LDA block,X
550 AND bit
560 BNE blob
570 LDY #32
580 .blob
590 TYA
600 JSR &FFEE
610 LSR bit
620 BNE bitloop
630 INX
640 CPX #9
650 BNE lineloop
660 RTS
670 ]NEXT
680 T%=0:FOR I%=&900 TO P%-1
690 T%=T%+?I%:NEXT I%
700 IF T%=8633 ENDPROC
710 PRINT"Checksum error":VDU 7
720 END
730 :
740 DEF PROCclock
750 REPEAT
760 A$=RIGHT$(TIME$,8)
770 FOR I%=1 TO 8
780 X%=I%*8:A%=ASC(MID$(A$,I%,1))
790 CALL bigchar
800 NEXT
810 UNTIL FALSE
820 ENDPROC
```

**Listing 3. Produces a big clock**

# TECHNOMATIC

**BBC COMPUTERS & ECONET CENTRE**
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

## BBC MASTER SERIES

| | |
|---|---|
| **AMB15 MASTER** (see page 5 for details of bundled software included in the price) | £385 (a) |
| **AMB12 MASTER ET** | £315 (a) |
| **AMCO6 Turbo 65C02 Module** | £99 (b) |
| **ADC08 512 Processor** | £195 (b) |

| | | | |
|---|---|---|---|
| ADF14 ROM Cartridge | £13 (d) | ADJ23 Ref Manual Part II | £14 (c) |
| ADF10 Econet Module | £41 (c) | ADJ24 Adv Ref Manual | £19.50 (c) |
| ADJ22 Ref Manual Part I | £14 (c) | View User Guide | £10 (d) |
| BBC MASTER Dust Cover | £4.75 (d) | Viewsheet User Guide | £10 (d) |

## MASTER ROM/RAM CARTRIDGES

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|---|---|
| TRC1 Two rom cartridge | £7.95 (d) |
| TRC4 Four rom cartridge | £9.95 (d) |
| TRC 32K Cartridge ind RAM. | £26.95 (d) |

## BBC MASTER COMPACT

**A free packet of ten 3.5" DS Discs with each COMPACT"** See page 5 for details

| | |
|---|---|
| **SYSTEM 1** 128K, Single 640K Drive & bundled software. | £385 (a) |
| **SYSTEM 2** System 1 with a 12" Hi Res Monochrome Monitor. | £469 (a) |
| **SYSTEM 3** System 1 with a 14" Med Res RGB Monitor. | £599 (a) |
| Second Drive Kit. | £99 (c) |
| Serial Kit. | £29 (d) |
| T.V. Modulator | £29 (d) |
| Extension cable for external 5.25" 80T Drive (Serial Kit). | £12.50 (d) |

## UPGRADE KITS

| | | | |
|---|---|---|---|
| 1.2 OS ROM | £15 (d) | ADFS ROM | £26 (d) |
| DNFS ROM | £17.50 (d) | 1770 DFS Kit | £43.50 (d) |
| BASIC II ROM | £22.50 (d) | Econet Kit | £55 (d) |

## ECONET ACCESSORIES

| | | | |
|---|---|---|---|
| Econet Starter Kit | £85 (b) | Econet Bridge | £174 (b) |
| Econet Socket Set | £29 (c) | Printer Server Rom | £41 (d) |
| File Server Level II | £75 (b) | 10 Station Lead Set | £26 (d) |
| Master FS Utility Disc | £17.25 (d) | | |

## ACW/CO-PROCESSOR

| | |
|---|---|
| For full specification see page 5 **32016 Co-processor** | £999 (a) |
| **Cambridge Workstation** | £3450 (a) |
| **X25 Gateway** | £2175 (b) |
| PANOS/PANDORA Upgrade incl 32000 BASIC FP. | £29 (d) |
| Co-Processor upgrade to 10 MHz operation for faster processing. | £POA (d) |
| Time Warp Real Time Clock with utilities for reading time and date in PANOS (for model B and B+ users). | £39 (c) |
| 32016 Instruction Set Manual. | £25 (c) |

## WINCHESTER DRIVES

| | |
|---|---|
| **P20HD TECHNOMATIC 20 Mbyte Winchester Drive including Acorn ADFS ROM** | £599 (a) |
| **P10HD TECHNOMATIC 10 Mbyte Winchester Drive.** Fully compatible with Acorn ADFS **Special offer** | £399 (a) |
| **P204HP TECHNOMATIC 20 Mbyte Winchester** and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom. | £849 (a) |
| **P2041HT** As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom. | £1,499 (a) |
| **TS10 10** Mbyte Tape Streamer Backup unit with utilities. | £695 (a) |
| **TFC10** 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10. | £19 (d) |
| ***Enquire for larger capacity Winchesters. These Winchesters are compatible with the S.J. File Server. Special adaptor for S.J. File Server*** | £28 (d) |

**WINCHESTER Drive Multiplexer**

| | |
|---|---|
| TWM2 for two computers. | £99 (b) |
| TWM4 for four Computers. | £159 (b) |

***Details on Technomatic Winchesters** on page 6*

## SECOND PROCESSORS

| | |
|---|---|
| **Universal 2nd Processor** | £75 (b) |
| **TORCH ZEP100** | £229 (a) |
| **MULTIFORM Z80** TECHNOMATICs multi format Z80 system includes a FREE Pocket Wordstar + MS/DOS Read/Write Utility | £289 (b) |

## ACORN IEEE INTERFACE

| | |
|---|---|
| Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs. | £265 (a) |

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| | |
|---|---|
| Converts your computer into a teletext receiver. | £95 (b) |
| BBC Publications rom for enhanced Teletext Utilities. | £7.95 (d) |

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|---|---|
| **EPSON LX86** 120 cps, variety of fonts, including NLQ, bit image graphics, IBM char/graphics compatible, centronics interface standard. | £199 (a) |
| **EPSON FX800** An enhanced version of FX85. Call for details. | £329 (a) |
| **EPSON FX1000** An enhanced version of FX105. Call for details. | £449 (a) |
| **EPSON EX800** See details on page 5. | £409 (a) |
| **Colour option for EX800/EX1000.** | £59 (b) |
| **EPSON LQ800** See details on page 5. | £439 (a) |
| **EPSON LQ1000** As LQ800 but wider carriage for 136 columns. | £589 (a) |
| **TAXAN KP815** Enhanced KP810 with 160cps and full IBM compatibility. | £269 (a) |
| **TAXAN KP915** Enhanced KP910 with 180cps and full IBM compatibility. | £369 (a) |
| **NATIONAL PANASONIC KX P1080** | £159 (a) |
| **STAR NL 10** (Parallel Interface) | £209 (a) |
| **STAR NL 10** (Serial Interface) | £279 (a) |
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| BBC Screen dump for Integrex. | £15 (d) |
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| **STAR POWER Type Daisywheel** A new low cost daisy wheel printer incorporating STAR technology for innovation and enhancements. Phone for details. See page 5 for details. | £229 (a) |
| **NAT PANASONIC KX P 3131** Daisy Wheel printer with 32K buffer, 17 cps, bi-directional, parallel interface | £249 (a) |
| **JUKI 6100 Daisy wheel printer** 15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface. | £259 (a) |

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| **HITACHI 672** | £459 (a) |
| **GRAPHICS WORKSTATION** | £599 (a) |
| **LINEAR GRAPHICS** | |
| **A4S PLOTMATE** | £370 (a) |
| **A4SM PLOTMATE** | £450 (a) |
| **A3M PLOTMATE** | £569 (a) |
| *(Enquire re educational prices for the Linear Graphics plotters)* | |
| **Parallel Printer Lead (1.2m).** | £6 (d) |
| **Serial Printer Lead (1.2m).** | £7 (d) |

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| | |
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## DISC DRIVES

**Full details on page 6.**
***All drives fitted with MITSUBISHI mechanisms.***

**5.25" Single Drives 40/80 switchable:**

| | |
|---|---|
| **TS400** 400K/640K | £114 (b) |
| **PS400** 400K/640K with integral mains power supply | £129 (b) |

**5.25" Dual Drives 40/80 switchable:**

| | |
|---|---|
| **TD800** 800K/128OK | £199 (a) |
| **PD800** 800K/1280K with integral mains power supply | £229 (a) |
| **PD800P** 800K/1280K with integral mainspower supply and monitor stand | £249 (a) |

**3.5" 80T DS Drives:** OFFER

| | |
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| **TD352** Dual 800K/1280K | £135 (b) |
| **PD352** Dual 800K/1280K with integral mains power supply | £187 (b) |
| **PD853** Combo Dual 5.25"/3.5" drive with psu. | £229 (a) |

## DISC DRIVE MULTIPLEXER

***Full specification on page 6.***

| | |
|---|---|
| **TDM2** Dual Unit: 2 computers/one drive unit | £75 (b) |
| **TDM4** Quad Unit: 4 computers/one drive unit | £135 (b) |

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| **747** 80T DS DD | £15.50 (d) |

(Add £1 for library case packing)

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| **Microvitec 1451** Medium Resolution 653 pixels | £225 (a) |
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| | |
|---|---|
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| **PHILIPS 8501** See page 10 for details. | £139 (a) |
| **TAXAN SUPER VISION 620** (NEW) 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible | £279 (a) |
| **TAXAN SUPER VISION 625** (NEW) 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. | £329 (a) |
| **MITSUBISHI XC1404** 14" Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible | £219 (a) |

**12" MONOCHROME MONITORS**

| | |
|---|---|
| **TAXAN KX1201G** Hi Res green etched screen | £85 (a) |
| **TAXAN KX1202G** Hi Res Long Persistence (P39) | £95 (a) |
| **TAXAN KX1203A** Hi Res amber etched screen | £95 (a) |
| **PHILIPS BM 7502** Hi Res green screen | £75 (a) |
| **PHILIPS BM7522** Hi Res amber screen | £75 (a) |

**MONITOR ACCESSORIES**

| | |
|---|---|
| Microvitec Swivel Base (14" plastic monitors) | £20 (c) |
| Philips Swivel Base | £14 (c) |
| Monitor Stand Models B & B+ | £10 (c) |
| Monitor Stand Master | £13 (c) |
| Double Tier stand Models B, B+ or Master | £24 (b) |
| Taxan RGB Lead | £5 (d) |
| Microvitec Lead | £3.50 (d) |
| Monochrome BNC/Phono Lead | £3.50 (d) |

## EPROMS/RAMS

| | |
|---|---|
| 2764-25 | £2.50 (d) |
| 27128-25 | £2.75 (d) |
| 6264LP-15 | £2.80 (d) |

## RAM/ROM EXPANSION

| | |
|---|---|
| **ATPL Board** for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams | £37 (c) |
| ATPL Battery backup kit | £16 (d) |
| ATPL Board for BBC+ (now in stock). | £31 (c) |
| **TIME WARP** Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program | £31 (d) |
| Time Warp with PANOS Utilities. | £39 (d) |

## MODEMS

(All modems are BABT approved)
***See page 7 for modem specifications***

| | |
|---|---|
| **MIRACLE WS2000V21/23** & BELL stds | £95 (c) |
| WS2000 Auto Dial Card | £27 (d) |
| WS2000 Auto Answer Card | £27 (d) |
| WS2000 SK1 Kit | £5 (d) |
| WS2000 DS1 disc | £10 (d) |
| WS2000 Data Cable for BBC | £6 (d) |
| **MIRACLE WS4000 V21/23** | £169 (b) |
| **MIRACLE WS3000 V21/23** | £295 (b) |
| **MIRACLE WS3000 V22** | £495 (b) |
| **MIRACLE WS3000 V22 bis** | £650 (b) |
| **WS3022 1200/1200 fd** | £395 (b) |
| **WS3024 2400/2400 fd** | £570 (b) |
| BBC Data Cable for WS3000/4000 | £7 (d) |

## PROGRAMMINGS ACCESSORIES/SOFTWARE

***See page 8 for detailed specification***
Compatible with B, B+ and Master

| | |
|---|---|
| **EPROMER II** while stocks last. | £89 (b) |
| **Eprom Ryter** (Epromer 111) See page 8 for details. | Approx £119 (b) |
| **MPROMER** | £49 (c) |
| **META ASSEMBLER** | £145 (b) |
| **PORTAL EPROM EMULATOR 128K** | £185 (b) |
| **PORTAL EPROM EMULATOR 512K** | £285 (b) |
| **TEAM Disassembler** | £145 (b) |

**EPROM ERASERS**

| | |
|---|---|
| **UV1B** 6 eproms, safety cutout | £47 (b) |
| **UV1T** 6 eproms, timer, safety cutout | £59 (b) |

# TECHNOMATIC

**BBC COMPUTERS & ECONET CENTRE**

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

305 Edgware Road, London W2 Tel: 01-723 0233

## CAD/DRAWING PACKAGES

**NovaCad** Cad Package for B, B+ & MASTER. (See page 9 for specification)

| | |
|---|---|
| **Tracker Ball/Mouse Version (TM)** | £79 (d) |
| **TM Version plus Tracker Ball** | £119 (c) |
| **TM Version plus Mouse** | £105 (c) |
| **Plotter Driver Generator** | £25 (d) |

**MOUSE**

| | |
|---|---|
| **AMX MOUSE with SUPER ART** (pse specify B, B+ or Master) | £63 (d) |
| **Super Art** | £43 (d) |
| **PAGEMAKER** | £39 (d) |
| **MAX** | £17.35 (d) |

**RB2 TRACKER BALL**

| | |
|---|---|
| RB2 Tracker Ball with Icon Master (for B, B+ & Master) | £59 (c) |
| RB2 Tracker Ball with Cursor Control Rom (for Master only) | £59 (c) |
| RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software) | £47 (c) |
| Cursor Control Rom for Master | £12.50 (d) |
| **MIRRORSOFT FLEET STREET EDITOR** incl VAT | £39.50 (d) |

## CP/M SOFTWARE

*for Acorn, Torch & Multiform Z80 Processors*

| | |
|---|---|
| **MICROPRO**'s Wordstar Professional | £310 (a) |
| **ASHTON TATE**'s DBASE II | £310 (a) |
| **SUPERCALC II** | £195 (a) |

*Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.*

*All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** comment on their use with other DFS systems.*

## BBC SOFT/FIRMWARE

### DATABASE MANAGEMENT SYSTEMS

| | |
|---|---|
| **VIEWSTORE** Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb | £37 (d) |
| **STARdataBASE** A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW. | £39 (d) |
| **MASTERFILE II** Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T) Please state DFS or ADFS. | £17 (d) |

### WORD PROCESSORS

| | |
|---|---|
| **VIEW 2.1** | £37 (d) |
| **VIEW 3.0** | £56 (c) |
| **VIEW INDEX** | £12 (d) |
| **VIEW PRINTER DRIVER GENERATOR** | £7 (d) |
| **DOT PRINT PLUS** Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP. | £28 (d) |
| **WORDWISE** | £24 (d) |
| **WORDWISE PLUS** | £38 (d) |
| **WYSIWYG PLUS** See page 7 for details. | £21 (d) |
| **INTERWORD** (If you own a WW+ then quote your reg number and pay £39). | £46 (d) |
| **SPELLMASTER** | £49 (d) |
| **WORDEASE** A 16K rom based utility for WW+ | £24 (d) |
| **SPELLCHECK III** A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc. | £31 (d) |
| **EDWORD II** (Please specify model B, B+, Compact or Master). | £43 (c) |
| **EDWORD II** Applications package | £27 (c) |

### SPREADSHEETS

| | |
|---|---|
| **VIEWSHEET** Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor. | £37 (d) |
| **WINDOMATIC** Enhances the power of Viewsheet See page 9 for details. | £15 (d) |
| **VIEWPLOT** A disc based plotting program. (To be released soon). | £22 (d) |
| **INTERSHEET** The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc. | £39 (d) |
| **INTERCHART** Graphics package for Intersheet | £27 (d) |
| **ULTRACALC** BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc. | £52 (d) |
| **MINI OFFICE II (for BBC B)** A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T) | £14.75(d) |
| **MINI OFFICE II (Rom)** | £48 (d) |

### LANGUAGES

| | |
|---|---|
| **META ASSEMBLER** Multi processor Assembler full details on page 8 | |
| **TEAM DISASSEMBLER** | £145 (b) |
| **MACROM** A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory. | £33 (d) |
| **ACORN MICRO PROLOG** Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly. | £62 (d) |
| **ISO-PASCAL** Acorn's full implementation of International Std Pascal on 2x16K roms. | £48 (c) |
| **ISO PASCAL STAND ALONE GENERATOR** | £30 (d) |
| **OXFORD PASCAL** A fast P-code compiler and stand alone utility (40 or 80 T) Specify B or B+. | £36 (d) |
| **OXFORD PASCAL** for Master | £52 (d) |
| **BCPL** | £46 (c) |
| **BCPL STAND ALONE GENERATOR** | £39 (d) |
| **ACORN LOGO** | £46 (c) |
| **LOGOTRON LOGO** | £55 (c) |
| **BBC PUBLICATIONS OPEN LOGO** | £59 (c) |
| **ACORN LISP ROM** | £39 (d) |
| **ACORN FORTH ROM** | £39 (d) |
| **ACORN COMAL ROM** | £43 (d) |
| **MICROTEXT** A frame based authoring system from NPL for interactive computer tutoring. Disc based | £52 (c) |
| **MICROTEXT PLUS** Extended Features incl extra memory, control of external devices etc. Rom based. | £229 (b) |

### COMMUNICATIONS

| | |
|---|---|
| **TERMULATOR** Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations. | £25 (d) |
| **COMMSTAR** A highly popular communication rom suitable for all general purpose applications (specify B or Master) | £28 (d) |
| **COMMUNICATOR** A full 80 col VT100 emulation program with easy to follow screen menus. | £49 (d) |
| **DATABEEB** A variety of facilities for use with WS2000 Modem | £26 (d) |
| **COMMAND** (specify the modem type) | £34 (d) |

### COMPACT (all on 3½" disc)

| | |
|---|---|
| **ARTROOM** | £27 (d) |
| **FONTWISE+** | £22 (d) |
| **FONT EDITOR** | £22 (d) |
| **RAMROD** | £37 (d) |
| **BROM PLUS** | £32 (d) |
| **MACROM** | £37 (d) |
| **BETABASE** | £27 (d) |

### UTILITIES

| | |
|---|---|
| **ACCELERATOR** | £49 (d) |
| **ACORN BASIC EDITOR** | £22 (d) |
| **MONITOR** (BBC Pub) | £34 (a) |
| **BROM PLUS** | £26.50 (d; |
| **SLEUTH** | £23 (d) |
| **TOOLKIT PLUS** | £31 (d) |
| **TOOLBOX 2** (BBC Pub) Manual<br>Cassette | £9.50 (d)<br>£9 (d) |
| **EXMON II** | £23 (d) |
| **HELP II** | £25 (d) |
| **ACORN GXR GRAPHICS ROM** specify B or B+ | £22 (d) |
| **PRINTMASTER** | £24 (d) |
| **PRINTWISE** | £24 (d) |
| **DUMPMASTER** supports about 40 printers | £26 (d) |
| **FONTWISE PLUS** | £17 (d) |
| **HERSHEY FONT CHARACTER GENERATOR** | £18 (d) |
| **ICON MASTER** | £29 (d) |
| **MOVIE MAKER** Two Roms + Cassette | £26 (d) |
| **ADV TELETEXT UTILITIES ROM** | £7.95 (d) |

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Please add carriage
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(b) £2.50
(c) £1.50
(d) £1.00

## BBC PUBLICATIONS EDUCATIONAL SOFTWARE

**A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.**

### PRIMARY EDUCATION

**ASTRONOMY:**
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. Disc **£11 (d)**

**COMPUTERS AT WORK:**
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. Aud/EC/disc **£16 (c)**

**PICTURE CRAFT**
An inexhaustible, inventive and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. Disc **£17 (d)**

**INTRODUCING GEOGRAPHY**
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. Disc **£16 (d)**

**MATHS WITH A STORY 1**
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. Cass **£8 (d)**

**MATHS WITH A STORY 2**
Similar programs as 1 but covered from a different angle. Cass **£8 (d)**

**NUMBER GAMES:**
6 programs designed to stimulate the mind of an active child of 8 years and upward. Cass/EC **£7.50(d)**

**USING YOUR COMPUTER**
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. Cass **£24 (c)**

**WORD PLAY**
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. Cass **£10 (d)**

**WORD MOVER**
A simple text editor. Cass **£8 (d)**

### SECONDARY LEARNING

**TECHNOLOGY & DESIGN Pt1** **£21.50 (c)**
**ELECTRIC FIELDS** **£10.50 (d)**

**ADVANCED LEVEL STUDIES: STATISTICS**
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Data Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. Disc **£23 (d)**

**ADVANCED STUDIES: GEOGRAPHY**
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. Cass **£10 (d)**

**INSIDE INFORMATION**
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres. Prog Cass **£10 (d)** Audio Cass **£5 (d)** Book **£8 (d)**

**SCIENCE TOPICS (ST)**

**S.T.: WAVES**
A Physics program allows display of waveforms and shows changes caused by different parameters. Disc **£14 (d)**

**S.T.: RELATIONSHIPS**
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. Disc **£14 (d)**

**S.T.: BONDING**
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. Disc **£14 (d)**

**S.T.: ELECTROMAGNETIC SPECTRUM**
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. Disc **£14 (d)**

**S.T.: ELECTRONICS IN ACTION**
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. Disc **£14 (d)**

**S.T.: NEWTON & THE SHUTTLE**
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. Disc **£19 (d)**

**S.T.: ECOLOGY**
Simulation program managing a nature reserve to meet a host of individual needs. Disc/EC **£19 (d)**

**S.T.: POLYMERS**
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. Disc/EC **£19 (d)**

**S.T.: CLASSIFICATION & PERIODIC TABLE**
A database program for producing different classifications of chemical information and presented in any format. Disc **£20 (d)**

**S.T.: FOOD & POPULATION**
Simulation in space of biological aspects of nutrition and food production logistics. Disc **£20 (d)**

**SEC. SCIENCE: MICROTECHNOLOGY**
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. Cass **£7 (d)**

**SEC. SCIENCE: THE MOLE CONCEPT**
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. Disc/Aud/EC **£16 (c)**

**SEC. SC.: UNIFORMLY ACCELERATED MOTION:**
Illustrates basic eqns., uniform accln, under gravity and an idea of terminal velocity. Disc/AUD/EC **£16 (d)**

### GENERAL

**VU TYPE PROFESSIONAL**
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. Disc **£19 (d)**

**WHITE KNIGHT MK II** Disc **£16 (d)**
(Specify it for Master).

**BATTLEFIELDS** Cass **£8.50 (d)**

**A VOUS LA FRANCE**
A home study aid for anyone learning French. Cass/EC **£17 (d)** Book **£5.25 (d)**
*Additional charge for discs* **£9.00**

**DEUTSCH DIREKT**
Disc based vocabulary learning prog with audio cassette to help with pronounciation. Disc/aud/EC **£16 (c)** Book **£5.95 (d)**

**MODEM MASTER** **£11 (d)**

**Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.**

## PRINTER ACCESSORIES

**EPSON ACCESSORIES:**
**Interfaces:**
8143 RS232....£30 (d)
8148 + RS232 + 8K....£65 (d)
8165 IEEE + Cable....£65 (d)
8132 Apple II....£60 (d)
8177P NLQ for FX80+/FX100+....£99 (d)
Parallel & Serial Buffers of various size also available.
**FX80/80+/85** Tractor Attachment....£29 (c)
**LX80/86** Tractor Feed....£21 (c)
**LQ800** Tractor Feed....£47 (b)
**LQ1000** Tractor Feed....£52 (b)
**EX800/1000** Colour option....£59 (b)
**H180** HP GL Emulation Rom + Ram....£63 (c)
**H180** Printer Emulation Rom....£38 (c)

**SHEET FEEDERS:**
8338 LX80....£52 (b)
8333 FX100+/105....£169 (a)
8331 FX80+/85....£129 (b)
LQ800....£135 (b)
LQ1000....£179 (b)
EX800....£135 (b)
EX 1000....£309 (b)
FX 800....£135 (b)
FX 1000....£179 (b)

**Ribbons:**
RX/FX100/100+. FX105....£7 (d)
RX/FX80/80+, FX85....£4 (d)
LX80....£4.50 (d)
LQ800....£8.50 (d)
LQ1000....£10 (d)
EX800/1000....£7.50 (d)
H180 Pen Set (Aqueous/Ball point)....£7.50 (d)

**Dust Covers:**
FX80....£5.50 (d)
TAXAN/Canon KP810....£6 (d)
FX100....£7.50 (d) KP910 £7 (d)

**HITACHI 672 Plotter**
Aqueous Pen Set six pens....£18.50 (d)
Oil Based Pen Set six pens....£25.00 (d)

**TAXAN CANON Accessories:**
RS232 + 2K interface....£63 (d)
Ribbon, KP810/815/910/915....£6 (d)

**Star Printer**
NL10 Sheet Feeder....£52 (b)
NL10 RS232 Interface....£69 (c)
NL10 IBM Type Interface....£39 (c)
NL10 Ribbon....£4.50 (d)

**National Panasonic KX P1080/81**
Spare Ribbon....£4.50 (d)
Serial Interface....£39 (c)
KXP3131 Tractor....£90 (a)
KXP3131 Sheet Feeder....£189 (a)

**JUKI 6100**
RS232 Interfaces....£65 (d)
Tractor Feed....£149 (a)
Ribbon (Carbon)....£2.00 (d)
Spare Daisy Wheel....£14 (d)
Sheet Feeder....£182 (a)

**BROTHER HR20**
Daisy Wheel....£18 (d)
Tractor Feed....£116 (a)
Spare Ribbon Nylon....£3.00 (d)
Spare Ribbon Carbon....£4.50 (d)

**INTEGREX INK JET COLOUR PRINTER**
Spare Ink Cartridge Black....£9 (d)
Spare Ink Cartridge Colour....£15 (d)
Paper Roll....£7 (d)

**Printer Leads:**
BBC Parallel Lead (1.2m)....£6 (d)
BBC Serial (Epson) Lead (1.2m)....£7 (d)
**Other lengths can be supplied on order:**
IBM Parallel Lead (2m)....£12 (d)

**PAPER & LABELS**
**Plain Fanfold paper** with micro perforations:
2000 sheets 9½"x11" 60 gsm/sq m....£12 (£3)
2000 sheets 14½"x11" 60gsm/sq m....£18.50 (£4.50)
1000 sheets A4 90 gsm....£12 (b)

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Single Row 3½ × 1 7/16"....£5.25 (d)
Triple Row 27/16" × 17/16"....£5 (d)

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## ACW443 CAMBRIDGE WORKSTATION

A complete self-contained workstation with:.
* NS32016 8MHz Main Processor & 32081 FP processor.
* 20 Mbyte Winchester and one 80T Ds floppy drive.
* A detachable keyboard Hi Res RGB Monitor.
* 4Mbyte of on board Ram as standard.
* Languages supplied include: Fortran 77, Pascal, C, Cambridge LISP, 32016 Assembler & 32bit BASIC.
* Utilities on the operating system to cross link programs between different languages, utilities for porting programs to mainframes.
* **Phone for detailed leaflet.**

## 32016 CO-PROCESSOR

***A second processor that brings genuine 'Mainframe' power to the BBC Computer.***
* Interfaces with the BBC through the tube connector.
* NS32016 6MHz CPU & 32081 FP processor.
* 1Mbyte Ram as standard.
* Packaged software includes all the languages and utilities supplied with the ACW Work Station.
* **Phone for detailed leaflet.**

CPU/FP Upgrade Kit (Acorn recommended) for the Co processor for 10 Mhz operation to enable faster processing. No fitting charge if supplied with the Co Processor

TIME WARP Real Time Clock with PANOS utility allows screen display of time, day and date within PANOS at anytime and allows these data to be printed on documents. Model B users will find this particularly useful.

## 512 CO-PROCESSOR

***Brings professional software to the BBC Master.***
* 10 Mhz 80186 *DOS PLUS.
* GEM Write & GEM Draw.
* 'WIMP' Environment with high quality Mouse.
* Runs many 'IBM' programs — even 'Flight Simulator'!
* Convert to/from IBM/BBC data.

## DOTPRINT PLUS

***A uniquely versatile NLQ ROM for the BBC Micro.***
* Built-in character font generator.
* Built-in view printer driver.
* Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
* True bold print as well as double width.
* 12 character pitch as standard.
* Fully variable pitch and line spacing.
* Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
* **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
* **DOTPRINT DUAL** for EPSON MX range.

**MICROJUSTIFIED TEXT**

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

**NORMALLY JUSTIFIED TEXT**

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

***Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.***

## FREE BUNDLED SOFTWARE WITH THE BBC MASTER



Authorised dealer for
**"Advanced Interactive Video System"**
Please send for details on the equipment and subsidies available to schools

We now supply the Master 128K Computer with educational software which enables immediate use of the computer.
The software package includes:

**VU-TYPE DISC**
The popular 'sight and sound' touch-typing tutor using colour graphics.

**WORDMOVER**
A program to help develop the vocabulary of primary school children

**WORD PLAY**
An elegant and simple program to introduce primary school children to the concept of word processing.

**DRAWSTICK**
A simple drawing program

**LOCO MOTION**
An animated game giving the player control of a train travelling around a network of some 50 screens.

## EPSON PRINTERS

Epson have launched a new series of printers to update the FX range. The new **FX800** and **FX1000** range combines printing versatility and superior technical features with the highest standards of reliability. The features include two NLQ fonts, 10, 12, 17, and 20 cpi, dble ht and dble width, 200 cps in draft and 40 cps in NLQ, tractor and friction as standard, IBM compatible, full graphics, 8K buffer, Parallel interface.

**EPSON EX8000/1000**
This range offers high speed printing to offer versatility in volume printing with speeds of 300 cps in 12 cpi mode. Four colour printing option is available for these printers.

**EPSON LQ800/1000**
This range with its 24 pin print head offers the highest standards in letter quality printing at high speeds while maintaining the versatility of dot matrix printers. The hex density graphics capability produces about the best printout any dot matrix printer can produce.

## STAR NL10

A 80 col 120 cps printer with fine NLQ at 30 cps offers novel and innovative features. There are no dip switches to set, full control from the front console. Plug in interface cartridge simplifies adaptation to different computers. Friction & Tractor feed as standards. Epson Compatible Graphics.

## NATIONAL PANASONIC KX P 1081

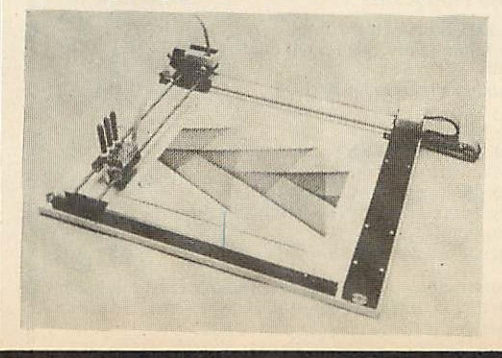
A high performance low cost printer with full character pitch feature 10, 12, 15 & 17 cpi and proportional spacing in both draft and NLQ mode. 80 column, 100 cps draft and 20 cps in NLQ. Parallel interface and Friction and Tractor feeds as standard. Epson/IBM Compatible Graphics.

## HITACHI 672

* A3 four colour precision plotter.
* Serial and parallel ports as standard.
* Produces 'OHP' transparencies as well as plain paper.
* 'HP' graphics language or single character commands.

## GRAPHICS WORKSTATION

**A A3 pen plotter with 0.1mm resolution allows graphs, charts, architectural drawings to be plotted using the 9 predefined plotting instructions or by using a CAD package. The pen mount allows a variety of pen types including drawing pens to be used or the following range of accessories to be fitted.**



### OPTICAL SENSOR

This converts the plotter into a input device and offers a new range of applications: Scan or digitise a picture or a drawing to display or store. Traverse mazes and investigate methods of artificial intelligence. Reliably read bar codes.

### DRILL/ROUTER

This will drill holes, machine moulds and cut complex 3-D shapes in a range of suitable materials to a depth of 16mm. Driver software is supplied on disc and an optional application program is available to interface the drill/router to our NOVACAD package.

### SCRIBER

The sharp pointed scriber may be used to etch fine line drawings on surfaces such as scraperboard, wax coated copper etc. Full details on request. See page 1 for price.

***All accessories available separately if required.***

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(24 hr viewdata system)
Tel:01-450 9764

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Telex:922800

RETAIL SHOPS
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Tel:01-208 1177 Telex:922800
(close to Dollis Hill ⊖)
West End Branch
305 Edgware Road, London W2
Tel:01-723 0233
(near Edgware Road ⊖)

For fast delivery telephone your order on 01-208 1177 using VISA/Acess Card

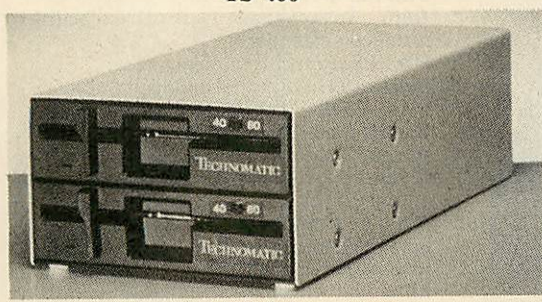
BARCLAYCARD VISA — Access

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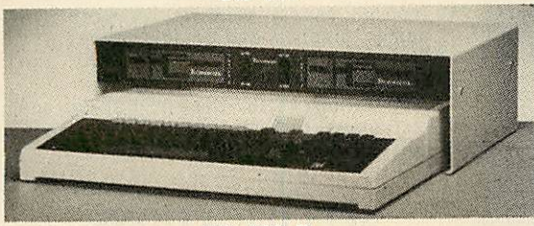
All prices ex VAT.
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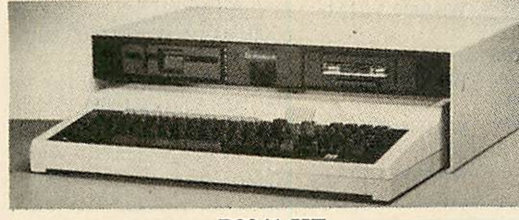
TS 400



PD 800



PD 800 P



P2041 HT

# DISC DRIVES

**TECHNOMATIC offers a wide combination of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.**

*** All Technomatic drives are fitted with quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.**

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

*PD853 Combo drive includes a combination of 5¼" (40/80T switchable) and a 3½" 80 Track Double Sided mechanisms. Complete with mains p.s.u. Ideal for software conversion for 5¼" to 3½" or vice versa.

**Such is our faith in Mitsubishi mechanisms that we offer a two year warranty on our floppy drives**

# WINCHESTER DRIVES

Mass storage 20 Mbyte drives are available in the following versions:

* P20HD Stand alone.
* P204HP With a single floppy housed in a plinth version case.
* P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.
* TS10 A stand alone 10Mbyte streamer for those who are already equipped with a Winchester and a floppy drive. Utilities for backup can only be loaded from a floppy.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

***ALL TECHNOMATIC FLOPPY DRIVES NOW CARRY A TWO YEAR WARRANTY***

## FLOPPICLENE
## Disc Drive Cleaning Kit

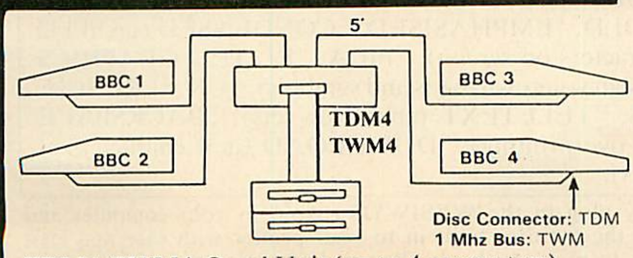
Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reuseable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25" and 3.5" drives. Please see page 2 for prices.

## DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications – simply plugs into the computers drive port connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same drives, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.

## WINCHESTER DRIVE MULTIPLEXER

A unique addition to our hardware range that allows the sharing of a Winchester between a number of computers. The principle of operation is the same as our highly popular disc drive multiplexers and there is no need for any additional software or hardware modifications. The Multiplexers are available in two versions, a dual unit for two computers and a quad unit for four computers to share a Winchester. Multiplexers are particularly useful for accessing common software and transferring data. Care needs to be excercised for certain types of random access files.




**TDM4/TWM4** Quad Unit (up to 4 computers)
**TDM2/TWM2** Dual Unit (2 computers)

# TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

# MODEMS

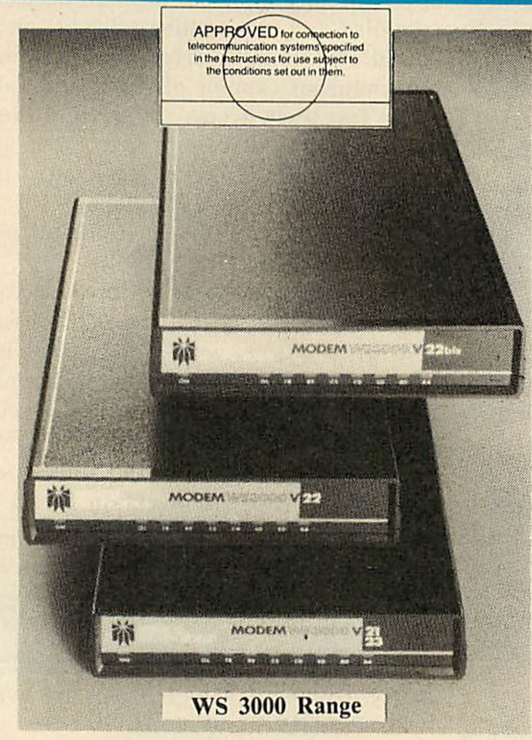
## MIRACLE WS4000

* A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
* Plain English commands make it simple to use, even for the first time user.
* Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
* Equalisation model in V23 for line-noise filtering.
* Many other options including upgrading to V22 and V22 bis.

## MIRACLE WS2000

* A comprehensive manually switched 'World Standard' modem.
* Competitively price with a capability to be upgraded for various options.
* BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
* Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).
* SK1 chip set for computer control.
* User port cable.
* Auto dial Board.
* Auto Answer Board.
* DS1 disc for auto dial facilities on Commstar.




WS 3000 Range

**Miracle have introduced two new models in the WS3000 series for users who require a modem for a specific use. Model WS3022 provides 1200/1200 baud full duplex operation whilst only WS3024 provides 2400/2400 baud fd only.**

*Please see page 2 for prices*

## MIRACLE WS3000 RANGE

* A professional range of intelligent modems with full BABT approval.
* Auto Answer and Auto Dial facilities installed as standard.
* HAYES protocols implemented.
* Pulse or DTMF 'tone' dialing.
* Plain English command structure simplifies the use of the modem.
* Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
* A line sharing facility to differential between data and voice calls.
* Intelligent speed buffering converts 1200/1200 terminals to 1200/75
* Equalisation mode for line noise filtering.
* Internal battery back up for storing 63 names, numbers and default settings.
* Upgrade path for 1200/1200 and 2400/2400 and security encryption.
* Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

## SPECIFICATIONS

| | |
|---|---|
| **WS4000 V2123:** | *CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75. |
| **WS3000 V2123:** | *CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75 |
| **WS3000 V22:** | *As V2123 and also 1200/1200 full duplex. |
| **WS3000 V22 bis:** | *As V22 and also 2400/2400. |

# MULTIFORM Z80

Includes a FREE Pocket Wordstar package

## *A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.*

* Multiform Z80 will run most CP/M 2.2 formats on the BBC.
* 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
* Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
* Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M.
* 8271 allows single density CP/M formats whilst 1770 DFS allows both single and double density CP/M formats. Single or dual drive, 40 or 80 track format and SS or DS drives can be used providing the CP/M format matches.
* Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
* Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
* Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

# WYSIWYG PLUS

NEW

This new screen/printer utility not only allows you to see on the screen exactly how the text is going to appear on the paper when printed but also simplifies the printer control codes that you need to use to get the different effects.

**WYSIWYG** + can be used in BASIC or from within most popular word processors like View, Interword & Wordwise Plus.

The printer commands have been simplified to meaningful words so that the user does not have to either remember or keep referring to the printer manual and try to decode the commands to VDU format. For example: *ENGLARGED will display enlarged text on the screen and send the appropriate command to the printer to print in enlarged mode.

**Some of the features you could see in WW + or from BASIC include:**
*SUBSCRIPT, *SUPERSCRIPT, *ENLARGED, *BOLD, *EMPHASISED, *CONDENSED (up to 132 characters on screen), *PICA, *ELITE, *GRAPHICS (design your own logos and symbols), *UK, *FRENCH, *US, *TELETEXT (character sets), *BACKSPACE (for overprinting), *DOWNLOAD (new characters or fonts).

Simply plug in the WYSIWYG+ rom in your computer and utilise the features built in to your printer with ease and least bother to produce the results you know are possible but not so simple to achieve. No other single package offers this much flexibility and simplicity to get the best from your printer.

**WYSIWYG** + rom is supplied with a comprehensive manual.

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(c) £1.50
(d) £1.00

# EpromRyter
## (Epromer III)
## Eprom Programmer

An enhanced version of the highly successful EPROMER II providing added sophistication to the eprom programming applications on the BBC computer range. The new software also utilises the extra facilities of the BBC Master computer. The programming methods are 'state of the art' of programming technology for fast, efficient and cost effective operation.

**The single rail eproms handled by the EpromRyter are:**
- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

The software is menu driven, many operations being single key. On screen help clarifying the operation being carried out. Will make the programming process very simple and easy for both specialists and novices alike. EpromRyter will operate in the same manner as Epromer II when used with BBC Model B and B+ and will require the Epromer II software.

**The main features of the programming software are:**
* Device, function and voltage selection from the computer keyboard.
* Continuous display of the options selected.
* All eproms upto 27512 (64K) programmed in single pass.
* Automatic Intelligent identifier support for eproms able to respond.
* Selectable programming voltage 25/21/12.5V
* 3 programming methods: Normal, Intelligent & Pulse (20 sec for a 27128).
* Serial port protocols supported.
* Intel HEX, Motorola S, HEX and ASCII protocols supported.
* DFS, NFS, ADFS and Rom Filing System Supported.
* BASIC/Machine Code programming using RFS.
* Powerful editor with input in HEX or ASCII. * Full editable 64K file.
* Block move of data within the address range.
* User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
* Multiple loading for ROM Filing System

*Some of the above features apply to Master Computers only*

**EpromRyter interfaces with the BBC through the 1 MHz bus, has a mains power supply and is fitted with a 3M TEXTOOL ZIF socket to provide consistent and reliable service for a long period.**

# META Version III

***"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."*** **Acorn User October 1986**

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

## PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

**PORTAL 128** (2716, 2732, 2764, 27128):
**PORTAL 512** (2716, 2732, 2764, 27128, 27256, 27512).

## MPROMER

An add on unit for Epromer II enabling the user to program 8741, 8748 and 8749 single chip microcontrollers. Now with the aid of cross assemblers such as META, the user can write code for the above devices and then with the aid of Micro-promer program the device.

* Simple menu structure with on screen help. i.e. select a function and on the screen will appear details of the function being performed.
* Comprehensive error reporting and checking.
* Read, verify, blank check, program from 1 to the maximum byte count for the device being used at any address location.
* Support for DFS, ADFS and cassette filing systems.
* Edit data in Hex or ASCII.
* Total control via software, no switches to worry about.
* Supplied with user manual and software on diskette.
* MPROMER simply plugs into the EPROMER II ZIF socket.

## TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

## BOOKS

**No VAT Carriage Code (c)**

**LANGUAGES**
6502 Assy Lang Prog.........£19.95
6502 Programming.........£13.95
8086 Book.........£23.95
Acorn BCPI User Guide.........£15.00
Acorn FORTH.........£7.50
Acorn LISP.........£7.50
Acorn ISO Pascal Ref Manual....£10.00
Intro to COMAL.........£10.00
Intro to LOGO.........£7.50
Micro Prolog Ref Manual.........£10.00
Introduction to Turbo Pascal.....£14.95
Prog the Micro with Pascal.........£8.50
The Supervisor's BBC Micro......£10.95
The UNIX Book.........£7.50
Unix User Guide.........£19.95
Understanding Unix.........£18.45

**BBC MICRO GUIDE BOOKS**
BBC User Guide Acorn.........£15.00
BBC Plus User Guide.........£15.00
Drawing Your Own BBC Programs.........£6.95
Inside Information.........£8.95
Maths Prog in BBC Basic.........£7.95
The Friendly Computer Book.......£4.50
Toolbox 2.........£10.95
VIA 6522 Book.........£4.50

**PROGRAMMING/UTILITY**
Advanced Sideways Ram User Guide.........£9.95
Advanced User Guide (BBC)......£15.95
Advanced User Guide.........£12.50
Applied Assembly Language on the BBC.........£9.95
BBC Micro Advance Programming.........£9.95
BBC Micro Ref Guide (B Smith).£10.95
BBC Micro Sideways ROM's RAM's .........£9.95
Guide to the BBC ROM.........£9.95
Beginners Guide to W.P.........£7.95
Mastering Assembly Code.........£8.95
Mastering Interpreters & Compilers.........£14.95
Mastering View, Viewsheet & Viewstore.........£12.95
View 3.0 User Guide.........£10.00
Viewstore.........£10.00
Viewsheet.........£10.00
Wordwise Plus.........£9.95

**SOUND & GRAPHICS**
Computer Graphics & CAD Fundementals.........£9.95
Mastering Music.........£6.95

**DISC DRIVE SYSTEMS**
Advanced Disc User Guide.........£16.95
Disc Book.........£3.50
Disc Programming Techniques.....£7.95
Disc Systems.........£6.95
File Handling on the BBC.........£6.95
Discovering Disc Drives.........£POA
Practical Disc File Techniques.........£5.95
Mastering the Disc Drive.........£7.95
Mastering Dos plus.........£12.95

**APPLICATIONS**
Interfacing Proj for BBC.........£6.95
BBC and Small Business.........£5.75
The Software Business.........£5.50

# TECHNOMATIC

**BBC COMPUTERS & ECONET CENTRE**
**17 Burnley Road, London NW10 1ED Tel: 01-208 1177**
**305 Edgware Road, London W2 Tel: 01-723 0233**

# NOVACAD

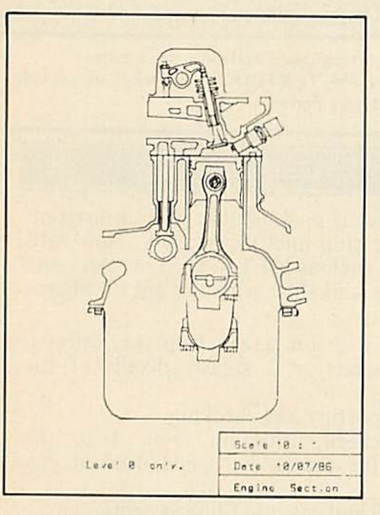
## *Computer Aided Draughting for the BBC Micro*

*" Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use. "* **Beebug December 1986**

*" Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market". "* **A&B Computing August 1986**

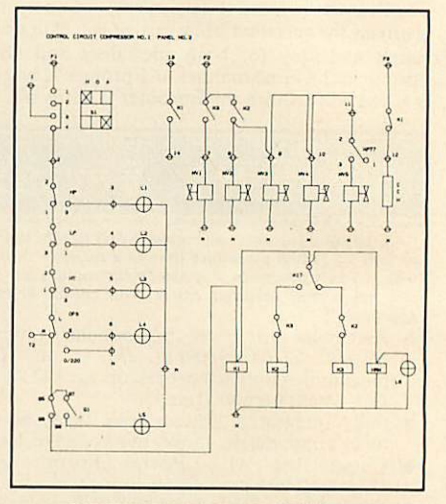
A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.



**The major features of NOVACAD are:**

* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
* A zoom facility allowing magnification of up to 20 times to insert finer details.
* Block copy of shapes on the screen for repetitive use.
* Text entry at any 90° orientation at any position on the screen.
* Create multi layer drawing with 8 levels available.
* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
* Printer routine for Epson 80 and 136 column printers.
* A unique optional facility to output to any BBC compatible plotter.



## MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

## NOVACAD

**is available in two versions**

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard. Tracker Ball or a Mouse.

## OPTIONAL EXTRAS

**Plotter driver generator** is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Preconfigured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

**ROUTCAD,** an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

***NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.***




# WINDOMATIC




All users of Acorn's VIEWSHEET spreadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in upto 10 separate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

**WINDOWMATIC** has been produced with the intention of recitifying these shortcomings and to bring out the very best from VIEWSHEET.

**WINDOMATIC** provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.
The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.
Windowmatic will work with BBC Master, BBC B+ and BBC B fitted with 6502 2nd processor. It is turbo compatible. It can be entered from VIEWSHEET by use of function keys or it may be run by loading a previously saved window configuration from disc. The program is supplied on disc with a comprehensive manual.

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(24 hr viewdata system)
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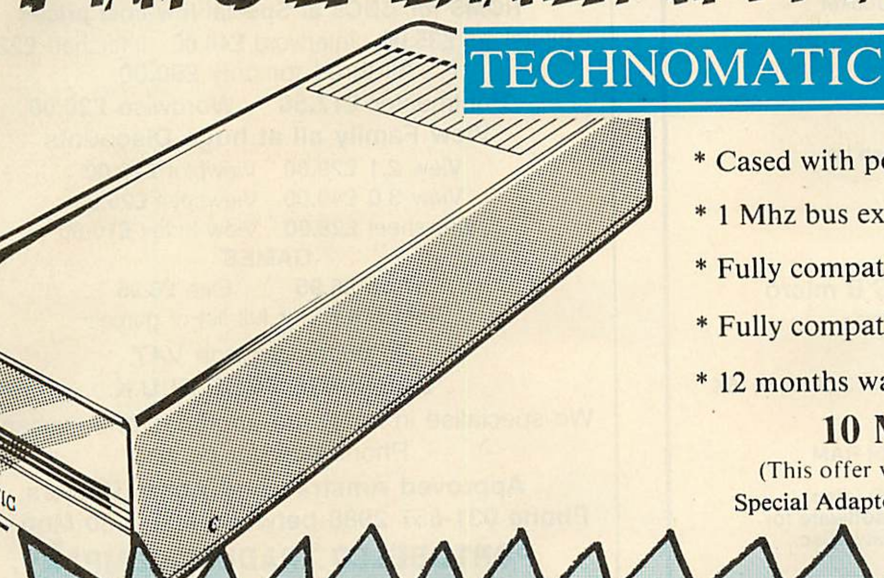
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(d) £1.00

# A PRICE BREAKTHROUGH




## TECHNOMATIC WINCHESTERS

* Cased with power supply and cooling fan
* 1 Mhz bus extension cable
* Fully compatible with Acorn ADFS and FS III
* Fully compatible with S.J. Research file server
* 12 months warranty

**10 Mbyte £399 (a);**

(This offer valid whilst current stocks last )

Special Adaptor for S.J. Research File Server **£28**

# SPECIAL OFFERS PAGE

## VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to .............

then you need:
**VU-type,** a complete touch typing program produced by BBC/Pitman.
It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.
Supplied on a 40T Disc with a manual.

Available at a special price of **£7.50 (d)**
instead of the usual £15. Offer valid while stocks last.

## EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Drawstick
Locomotion

These programs are available on 40T discs and Cassettes.

All for **£17.50 (d)**
Normal RRP over £40.

## 3½ DISC DRIVES

* 400K/640K capacity perdrive in DFS/ADFS modes.
* Mitsubishi 80 track double sided ultra low power, fast access mechanisms.
* The drives are supplied fully cased and with cables ready for connection to a computer.
* Drives powered from the computer
* 2 years warranty.

**Single Drive £75 (b)**

**Dual Drive £134 (b)**

## CYGNET ELECTRONICS

**RAMWISE 16K RAM module**
**For the BBC B & B+ micro**

**ONLY £21.50**

Expand the ROM capability of your micro without the need to fit expensive ROM boards. RAMWISE is an easy to fit and easy to use 16K sideways RAM module.

* No soldering required
* Small module plugs into any spare ROM socket
* Low power CMOS RAM chips used
* Already used in schools and colleges on ECONET and E-NET systems
* Runs all existing ROMS
* More than one module can be fitted
* Write protect switch included
* Compatible with RAMWISE II board and can be used on ATPL board

---

## RAMWISE II

**32K RAM/ROM board for BBC B micro**

**ONLY £38.95**

This board provides 2 EXTRA ROM sockets + 2 banks of 16K sideways RAM.

* Battery backup for 32K RAM as standard
* Write protect switch controls both banks of RAM
* No soldering required
* Direct load from disk to SWR using * LOAD (afsp)
* FREE utilities disc to load and save ROM software for RAMWISE & RAMWISE II. State 40 or 80 track disc.

Education Discounts available
FREE P&P. Cheques, P.O. etc. to:
CYGNET ELECTRONICS, PO Box 27, Bordon,
Hants GU35 0HH. Tel. (04203) 5229

## BEST PRICES IN THE U.K.

Access — BARCLAYCARD VISA

**Low cost Acoustic Modem for BBC Model B.**
**All software and leads supplied.**
**1200/1200 and 1200/75 Baud switchable.**
**British Telecom Approved**
**Limited offer only £19.95**

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All three for only ***£90.00***
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**CARRIAGE FREE IN U.K.**

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**Phone 031-657 2988 between 9.30-5.30 Mon.-Sat.**

**PORTOBELLO TRADING COMPANY,**
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**EDINBURGH,**
**EH15 2AS**

## EURO TEXT & COMMUNICATIONS EDITOR

### the all-in-one text editor

Provides editing, printout and communications facilities all integrated in a single easy to use program. Plus extended character set for foreign languages or symbols, fast file search for mailmerging or vocabulary searches, and comprehensive printer routines giving close control over printout.

★ Full *wysiwyg* screen editing in 80 col. mode typically with max. 3950 chars. current text.
★ Built-in communications for scrolling data bases (e.g. TGOLD) or user to user.
★ File search and incorporate routine (search speed 1000 chars. per sec.)
★ Insertion of printer codes anywhere on a line.
★ Printout on any daisy or matrix printer (Epson compatible matrix printer required for full range of user defined characters).
★ Pause during printout, enter text or codes directly from keyboard, or abort printout.
★ In 16K ROM for BBC B with DFS.




*A truly functional tool for text and message handling*

**EDINBURGH TRANSLATIONS LTD.**
14 Stafford Street, Edinburgh EH3 7AU
Tel. 031-225 8965

## VIDEO-TITLER II (BBC OR MASTER-128)

**VIDEO-TITLER II is a sophistifcated professional titling/caption generator program with features that will impress both the pro and semi-pro and semi-pro video maker.**

***Features include:***

★ 8 large fonts ★ Proportional spacing ★ Unlimited page saving & recall
★ Full, fast text editing for auto centering or screen positioning.
★ Drop shadow & underlining. ★ Use of 16 colours in Modes 1 or 2
★ Broadcast-style VTR starter clock allowing user to add college or company name & programme details for idenfication.
★ A full Mode 7 sub-titler program using centred double-height characters in a blue box background with full text editing, saving & reloading.
★ Program ideal for slide-making and A/V applications.

Simplicity of use is the key to the success of this excellent suite of programs which is used extensively by colleges and video-makers around the country. Supplied with full instructions, advise on titling your video productions and colour interfacing your BBC with a video recorder.

**BBC-B users only** must have minimum d/sided single drive & BASIC II. MASTER-128 version supplied on ADFS.

BBC-B or Master versions are £15.75, or £25 for both if ordered together.

Existing users can upgrade from BBC-B to Master 128 for £10. Demo disc £2.20.
Official orders welcome. Please add £2 for overseas orders.

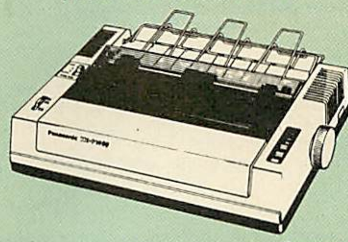
**WHEN ORDERING PLEASE STATE COMPUTER VERSION REQUIRED & TRACK FORMAT.**

**VIDEO-TITLER II is available exclusively from:**

**VISIONCRAFT SOFTWARE**
**PO BOX 135, LONDON N20 0HF.**

NEW

## Panasonic KX-P1081
(Now IBM Compatible)



**from the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer**

Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 120 cps of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 × 9 matrix, with Near Letter Quality effected by means of an 18 × 18 matrix.

***(Price inludes, FREE A 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).***

Special Price: **£149** (carr. £7)

Panasonic RS232 Interface: **£39**

### Panasonic KX-P1092 Dot Matrix Printer

Similar to KX-P1081 but has 180cps speed, Draft/NLQ down loadable characters option and is IBM/Epson compatible.

**Price £345**

### Panasonic KX-P3131 Daisy-Wheel Printer

A few months ago, we introduced the KX-P1080 to our large and discerning customer base. As a result of the enthusiastic and overwhelming reaction to this versatile dot matrix printer (see above for details), we are now extremely pleased to be able to bring you details of the fabulous KX-P3131 Daisywheel Printer, also from Panasonic. The KX-P3131 printer is the ideal printer for the home user wishing to produce clear, immaculate letters or reports.

Ideally suited to the pocket of the home user, costing not much more than a pair of disc drives, this daisywheel printer delivers flawless text at 10, 12 or 15 characters per inch. It also supports proportional print mode.

Printing at a respectable 17 characters per second, the KX-P3131 features a capacious 6 kilobytes printer buffer to swallow most printing requirements with ease. For the more demanding user, there is a 32 kilobytes printer buffer option available. Taking paper up to 13.5" wide, the KX-P3131 prints with bidirectional logic seeking, ensuring the minumum time to print your text.

Only **£218** (carr. £7)

| | |
|---|---|
| Single Sheet Feeder | **£195** |
| Tractor Feed | **£90** |

NEW

## YU-S25 Printer Stand



This new printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***Special Introductory Offer***

**Only £29**




We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

**MICROVITEC 14"**

- 1431 – Medium resolution as used on the BBC television computer programme **£175**
- 1451 – High resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- Dust Cover for Microvitecs **£5.50**

**KAGA-TAXAN 12"**

- KAGA KX1201G Hi-res Green Monitor **£85**
- KAGA KX1202G Long persistence Hi-Res Green Monitor **£93**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£93**
- KAGA Vision 2 Hi-res RGB Colour monitor. Ideal for Wordprocessing **£260**
- **Kaga Super Vision 3**, Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£309**
- 12" Anti-Glare Screens **£9.50**

**PHILLIPS 14"**

- Hi res Colour Monitor with facilities for AUDIO OUT and switch for Hi res Text display in Green. Recommended for user with BBC Master Series Computer by Acorn Computers Ltd.

**Only £229**

**ZENITH**

**"Test Bureau Recommended for use in Education"**

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

| | |
|---|---|
| Green (New Design) Hi-res | **£69** |
| Amber (New Design) Hi-res | **£74** |

**LEADS**

| | |
|---|---|
| **BNC Lead for Zenith or Philips** | **£3** |
| Skart Monitor Lead | **£5** |
| RGB lead for KAGA | **£3** |

**N.B.** carriage on Monitors **£7** (securicor)

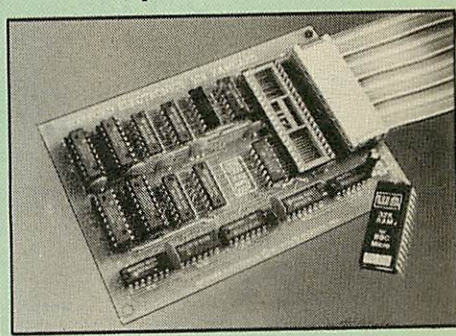
### SWIVEL BASES

**for Video Monitors**

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

## 32K SHADOW RAM-Printer Buffer
### Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

***See next page for SPECIAL OFFER***

**Only £59** (carr £2)

(Price includes a comprehensive manual and the ROM)

**Continued** 

## INCREDIBLE WORD PROCESSING DEAL ! ! !

*Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!*

*A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:*

***Only £89*** (carr £2)

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

## NOW WITH EXTRA FEATURES AT NO EXTRA COST Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities ten simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

## WATFORD's & ACORN's SINGLE DENSITY DFS

*Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).***

PRICES

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£62**
- *Acorn's 0.90 DFS Kit complete* **£57**
- *DFS Manual (Comprehensive)* (no VAT) **£6.95**
  *(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).*
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

## WATFORD's DOUBLE DENSITY DFS INTERFACE

*The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.*

*The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.*

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* (no VAT) **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£29**

## BBC MICRO BUSINESS/ WORD/PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). Please telephone or call in at our retail shop to discuss your particular requirement and a demonstration.

**EXAMPLE PACKAGE**

BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40-80 track double sided Disc Drives, Zenith Hi-Res green monitor, Panasonic KX-P3131 professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

**Only £899**

A Low Cost wordprocessing package: Same as above except, a single disc drive instead of a twin and Olivetti Spark Jet Printer instead of Panasonic.

**Only £625**

## MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

**£5.95** (Book No VAT)

# EXTENDED WARRANTY

Now Available
For BBC, Masters, Disc Drives & Monitors.
Write or phone for further details

## DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket. **£4**

## NEW MARK II LIGHT PEN + PENPAL 2

The Watford Electronics Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

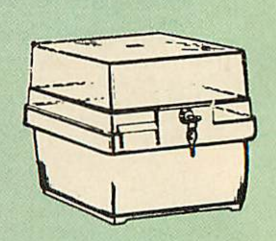
**Price Only £15**

## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. **£8**

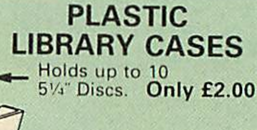
## ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- M35 - holds upto 50 discs **£8**
- M85 – holds upto 95 discs **£10**
- M50 – holds 50 3½" Discs **£10**

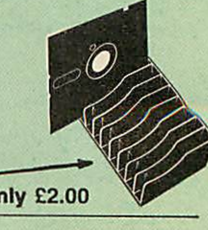
## PLASTIC LIBRARY CASES



Holds up to 10 5¼" Discs. **Only £2.00**

**DX-08**

DX-08: Holds up to 8 5¼" Discs while in use **Only £2.00**



## DUST COVERS (For our Disc Drives)

*Single CLS (without PSU)* **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.*

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

*Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

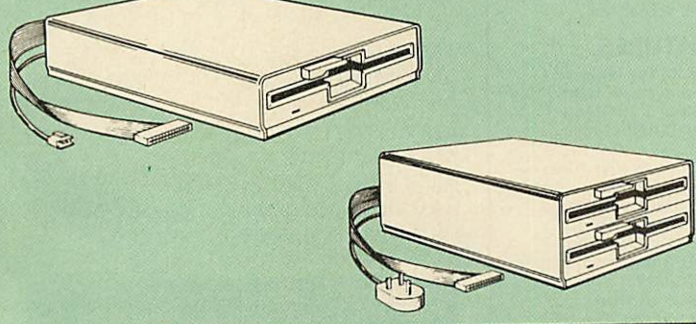
*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply; in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!*

*When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth.* *(Turn to the 10th page of our advert for the Plinths).*

*P.S. All our 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

**Cable to connect 5¼" Disc Drives to BBC Compact**
**Single £9 Twin £12**
**Special Cable to connect 3½" and 5¼" Disc Drive to BBC Compact £13**



| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 200K (360K) | CLS 200 £95 | | CS 200 £108 | |
| 400K (720K) | CLS400S £96 | CLD 400 £180 | CS 400S £109 | CD400 £200 |
| 800K (1.44M) | | CLD 800S £183 | | CD 800S £204 |

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
**Securicor carriage on Disc Drives £5 to £6**

*Prefix **C** = Cased Drive*
*L = Less PSU*
*S = Single*
*D = Double*

*Suffix **S** = 40-80 Switchable*

*e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40-80 track).*

## 3M – DISKETTES

*3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.*

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£10**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£15**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£15**
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT* **£30**
- *10 × 3½" S/S D/D 40/80 track Discs* **£18**
- *10 × 3½" D/D D/D 40/80 track Discs* **£22**

## TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

**DON'T SETTLE FOR LESS, BUY THE BEST**

- *10 × **M3** 3½" D/S D/D 80 Track Discs* **£20**
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* **£9**
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* **£11**
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* **£14**
- *3" Double Sided Discs* **£3 each**

## Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

**BULK PACK DISCS in lots of 100**

| Type | S-S 40T | D-S 40T | D-S 80T |
|---|---|---|---|
| ● Without Sleeves | £46 | £49 | £72 |
| ● With Sleeves | £49 | £52 | £75 |

## ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050; 30 Megabytes £1549**

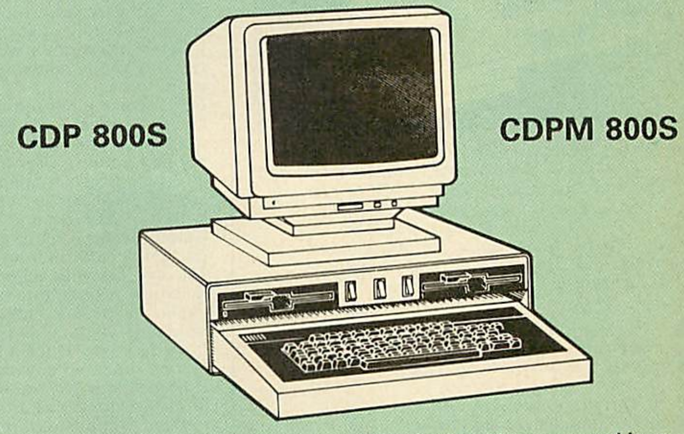
## WATFORD's WINCHESTER DRIVES

- 20 Megabytes with ADFS **£635**
- 40 Megabytes with ADFS **£999**

## WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

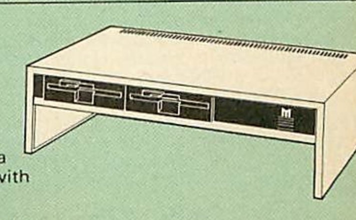
**CDP 800S** **CDPM 800S**



**Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.**

**CDP 800S for BBC Micro £210** **CDPM 800S for Master £225**
*(Securicor Carr. £7)*

## ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP £250 **Our Price: Only £199** (carr £7)

EPSON NLQ ROM
*for the BBC Micro*

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.
*(Send an SAE for sample printout)*

**Only: £25**

VIEW PRINTER DRIVER for NLQ ROM **£7**

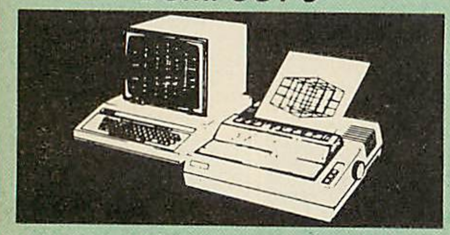
## THE NLQ DESIGNER
### (The First & still the Best)
***SPECIAL OFFER this Month: Supplied with over 25 Different fonts***

*A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.*

*Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)*

- *NLQ Designer ROM & FONT Disc* ***£25***
- *Kaga Individual FONT ROMs* ***£10***

## *DUMPOUT 3*



*A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.*

*Facilities:*
- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

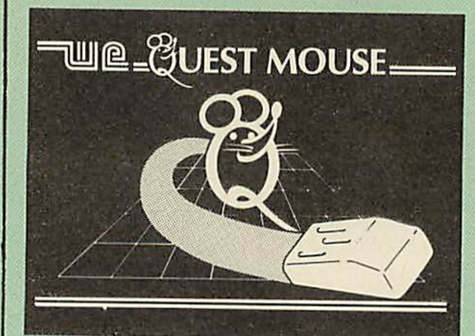
*The Micro User Feb. 1985.*
*'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".*

For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

**Only: £25**

**(Write in for further details on all above ROMS)**

NEW




## QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse. This package must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist looking for the most powerful drawing program around.
The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc. will work with it. The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford Quest Paint software and so that worn out mice can be replaced for minimum cost.
The Mouse features high resolution 50 PPI operation. It has a rubber ball for maximum accuracy and has three buttons to allow a massive range of options to be accessed without touching the keyboard.

## QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.
The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard. The software is carefully designed tc provide all the features needed by the budding artist. It is the nearest we can get to using paintbrush, airbrush, pencil and rubber on your computer screen.

### SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. For a full leaflet describing the software in full detail please write to us.
Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, dither pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or centre spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size change. Trace round areas of colour. Zoom for fine editing. Compatible with screens from Watford Beeb video digitiser. Load and Save screens with colour palette information, save brush and pattern definition etc.

**SPECIAL INTRODUCTORY OFFER**

| | |
|---|---|
| QUEST MOUSE & QUEST PAINT | £59 |
| QUEST MOUSE ONLY | £35 |
| MOUSE MATS | £5 |
| QUEST PAINT SOFTWARE | £34 |

*(Quest Paint supplied complete with Software in a 32K ROM, User Guide and Utility Disc)*
*(PS. The Watford Quest Mouse is FULLY Compatible with the AMX Mouse, therefore all AMX Software will work perfectly with it)*

**By popular demand our retail shop is now open until 8pm every Thursday**

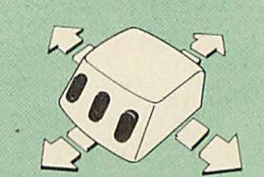
## NEW MEGABUFFER 256

This new Megabuffer 356 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:
- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

**Only £99** (carr £2)

# *THE AMX MOUSE*



**Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.**

**ONLY: £63** (carr £1.50)
*(Please specify for BBC or Master Computer)*

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

| | |
|---|---|
| AMX MAT | £5 |
| AMX MOUSE ONLY | £35 |
| AMX DESK Package | £19.00 |
| AMX UTILITY Package | £11.00 |
| AMX SUPERART Package | £39 |
| AMX PAGE-MAKER Pack Best desk-top publishing software. Works with keyboard, joystick and AMX Mouse | £32 |

**We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.**

| | |
|---|---|
| PAGE-FONTS Over 20 fonts for use with AMX PAGE-MAKER | £9.50 |
| EXTRA EXTRA | £19 |
| AMX 3D ZICON Disc | £19 |
| AMX Database Disc | £19 |
| AMX XAM Educational | £19 |
| AMX MAX( A gem of desktop (ROM) | £17 |

## RB2 MARCONI TRACKER BALL

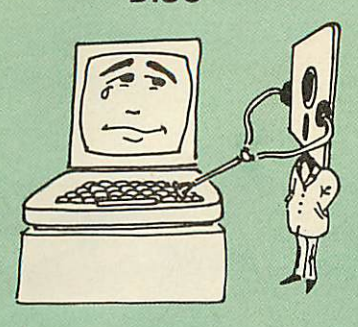
This popular unit is supplied complete with software.

Price: **£59**

## FLEET STREET EDITOR

Software pack **£35**

## DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.
At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## BBC Publication's Popular Educational Software

- Maths with a Story 1 (Cassette). 4 primary level maths programs **£10.95**
- Maths with a Story 2 (Cassette) 4 further maths programs **£10.95**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£19.95**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£14.95**
- BONDING: Science (Disc) O Level Chemistry program. **£14.95**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£14.95**
- ELECTRONICS IN ACTION (Disc) O Level program **£14.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£6.95**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£17**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£20**

## TED

### The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.
Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

**Price: £35**

## ROM-SPELL

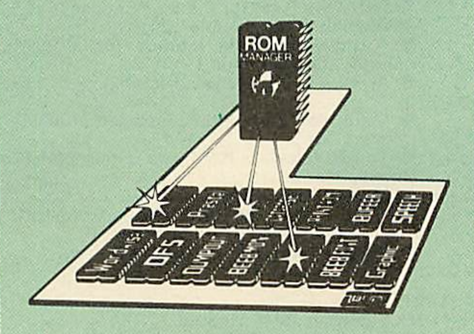
"way ahead of any competition"




Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.
*NOT compatible with 1770 DFS.*
*(Please state 40 or 80 track disc)*

**Price still only: £25**

## ROM MANAGER




Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
*"Provides comprehensive management of all your installed ROMs".* (BEEBUG November '84.)

**ONLY £20**

NEW

## THE EUREKA CARD

### (The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!
Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.
The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

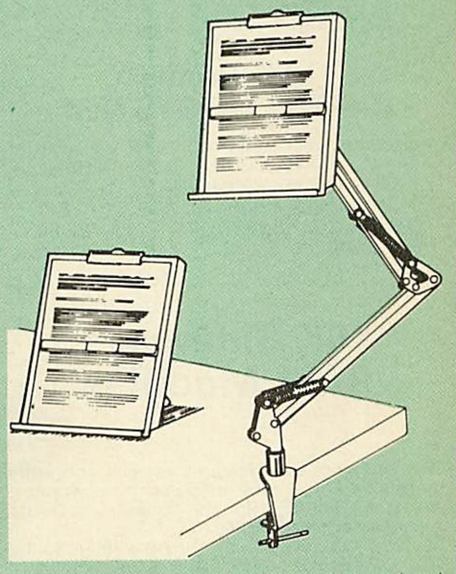
Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

## BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

## COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.
Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip.

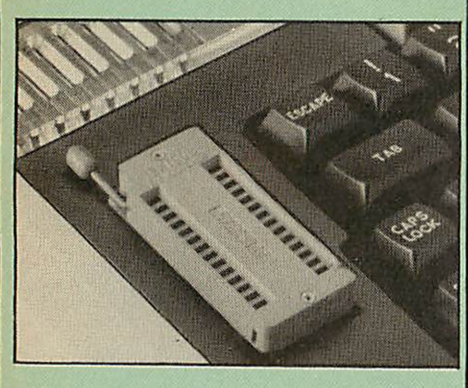
Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

**Continued** →



## SIDEWAYS ZIF SOCKET




Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

| | |
|---|---|
| ● Complete System | **£11** |
| ● Spare Cartridges | **£2.50** |
| ● Spare Rack | **£1.50** |

## 16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

### Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

## 16K DISC RAM

Unlike other RAM boards, this revolutionary, battery backed up, write protectable 16K sideways RAM board allows you to run from disc every sideways ROM available.

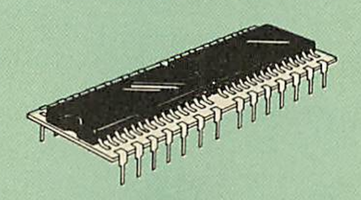
Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

**New Low Price: £32** (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

**Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.**

Do you require:

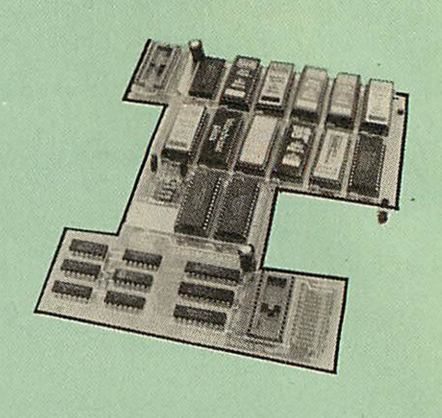
- Sideways RAM for a BBC B+ Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

## GRAPH PAD 2

Supplied complete with Software
**£60** (Carr. £3)

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £32**
Battery backup fitted **£36**
(carriage £2)




## The BBC B+ Micro ROM EXPANSION BOARD

Specially designed for all BBC Plus users, this board sits in an external box, and will accept either 10 off 16k EPROMs, OR 10 off 32k EPROMs.

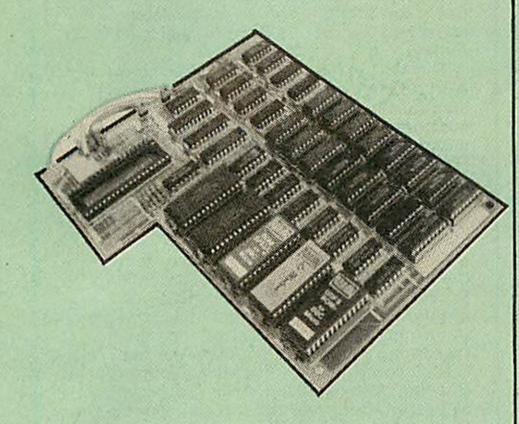
With the 32k EPROMs, only 5 can be 'online' at once (that's all the B+ can address, as each chip 'holds' two normal sockets worth), but you can swap between the two banks if necessary. With the 16k EPROMs, you can obviously address them all at once. An extra card can be added to permit 2 banks of 10 EPROMs to be used (again with only one bank available at once).

The ROM box, which has its own mains power supply, and connects to the BBC Plus via a specially designed card (which is a buffered card for your peace of mind) permits easy access to the EPROMs via the hinged lid. NO soldering is required for this board.

**£79** (carr £2)

# Watford ROM/RAM CARD

### A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

***INTRODUCTORY PRICES:***

- *ROM/RAM card with 32k dynamic RAM* ...... ***£39***
- ROM/RAM card with 64k dynamic RAM ...... ***£52***
- ROM/RAM card with a massive 128k dynamic RAM ...... **£80**

(carriage on ROM-RAM Card £3)

***OPTIONAL EXTRAS:***

- *16k plug-in Static RAM kit* ...... ***£6***
- *16k Dynamic RAM for Upgrade* ...... ***£7.50***
- *Battery backup* ...... ***£3***
- *Read and Write protect switches* ...... ***£2 each***

*Complete ROM-RAM board (all options installed)* ...... ***£89***

# Le Modem




### The MODEM from Watford

*At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.*

*The features that make Le MODEM such good value are:*

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***
- *BT Approval applied for.*

*(When ordering, please specify the version required, (BBC or Master)*

## SPECIAL OFFER

Price: **£74**
(carr £3)

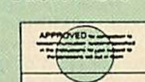


(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

# Nightingale Modem

SPECIAL PRICE to our Customers

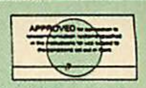
**£85**



(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

| | |
|---|---|
| Nightingale Modem without software | **Only £75** |
| COMMSTAR ROM package only (P&P on modem £2.00) | **£29** |
| Auto Dial Utilities Disc | **£9.50** |

# APOLLO



### The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Special Launch Price: **£75**
**(Carr £3)**
(Write in for full specification)

## BT TELEPHONE CONNECTORS

| | | |
|---|---|---|
| LJU | 1/4A Mini Line Master | **£4.50** |
| LJU | 1/6A Mini Line Slave | **£3.00** |
| LJU | 2/4A Line Master | **£4.00** |
| LJU | 2/6A Line Slave | **£2.50** |
| LJU | 3/4A Flush Master | **£3.95** |
| LJU | 3/6A Flush Slave | **£2.75** |
| LJU | 10/3A Dual Splitter | **£5.50** |
| | 4 Way BT Plug | **£0.75** |

Versatile **BEEB SPEECH SYNTHESISER** Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

**Continued**



## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £48 |
| CARETAKER Basic Utility | £25 |
| DISC DOCTOR | £28 |
| Graphics ROM | £23 |
| TERMI | £25 |
| COMMUNICATOR | £49 |
| SPEECH ROM | £24 |
| Printmaster | £24 |

**Wordwise** £24

**Wordwise plus**

**WORDWISE PLUS £40**

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

**Word-Aid**

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

**HI-WORDWISE-PLUS DISC: £5**

**SPELL MASTER Only: £49**

**Inter SHEET** ONLY £37




ONLY: £26

**Inter-WORD**

**Only: £42**

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

Only: **£39**

All Prices Exclusive of VAT

## VIEW

| | |
|---|---|
| VIEW WORDPROCESSOR 2.1 | £37 |

**VIEW 3.0 ROM**

Price: Only **£54**

| | |
|---|---|
| **HI-VIEW** (for use with 6502 2nd Processor) | **£36** |
| **VIEW Printer Driver Generator** Please specify Disc or Cassette) | **£9** |
| **VIEWSHEET (Acornsoft)** | **£37** |
| **VIEWSTORE** | **£37** |
| **VIEWSPELL with 80 track disc** | **£29** |
| **VIEWPLOT Disc** | **£22** |
| **VIEW-INDEX** | **£12** |

### Watford's own Sophisticated VIEW PRINTER DRIVERS

| | |
|---|---|
| Epson FX80 & Kaga KP | £10 |
| Juki & Brother HR15 | £10 |
| Silver Reed Printers | £10 |

### ADVANCED COMPUTER PRODUCTS

| | |
|---|---|
| Adv. Disc Toolkit | £29 |
| Adv 1770 DFS for Mast/Compact | £29 |
| Adv 1770 DFS for BBC/BBC+ | £29 |
| Adv Disc Investigator | £24 |

**MINI OFFICE II (disc) £14.50**

## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£13** (40 or 80 track)

النور

## *ARABIC ROM* for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

20, 40 and 80 column operation. Compatible with ASMO (449). English-Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

**£85**

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

## VIEW PRINTER DRIVER ROM

**(Professional facilities for demanding users)**

View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**




**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234-33383**

## THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

## ROMAS

### THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8
P.S. This includes the Acorn 6502 & Z80.

A give away at . . . **Only £29**

Please specify 40 or 80 track disc when ordering.



# ARIES CORNER

## Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20: the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

## Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

## THE ARIES RANGE HARDWARE REQUIREMENTS

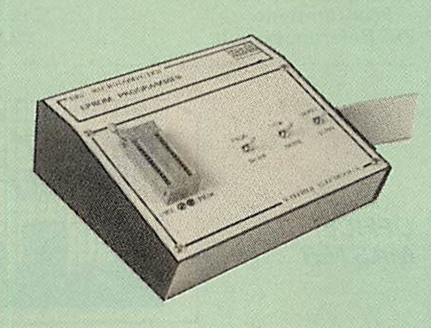
Aries B-32 & BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 & BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

## ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

## EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

**SOFTWARE PACKAGE**
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette-disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

**Software facilities include:**
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

**SPECIAL OFFER £69** (£3 carr.)

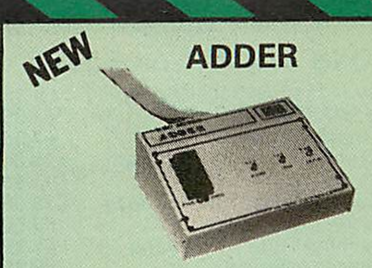
## TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**



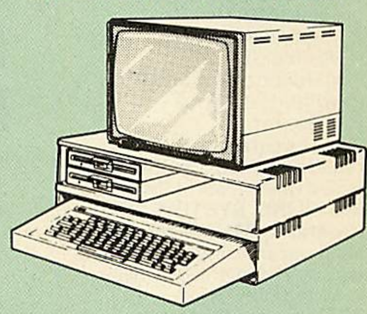

## NEW ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:
Two ultra fast programming algorithms or standard slow algorithm.
Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
Automatic processing to handle a list of files to program into the EPROM.
Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
Works with all standard filing systems.
Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM.
More than one file per ROM permitted.
Programs the following EPROMs:
From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

***SPECIAL INTRODUCTORY OFFER:* £65**

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

| | |
|---|---|
| SINGLE BBC PLINTH | **£11** (carr. £1.50) |
| DOUBLE BBC PLINTH | **£20** (carr. £2.00) |
| PRINTER PLINTH | **£10** (carr. £1.50) |
| SINGLE MASTER PLINTH | **£14** (carr £1.50) |
| DOUBLE MASTER PLINTH | **£25** (carr £2.00) |

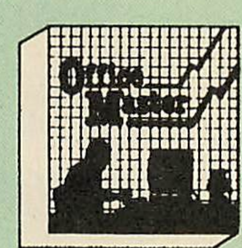
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## BOOKS (No VAT on Books)

| | |
|---|---|
| 15 Hrs Word Processor Using BBC | £3.95 |
| 30 Hour BASIC (BBC Micro) | £7.95 |
| 40 Best machine Code Routines | £7.95 |
| 6502 Assembly Language Program | £19.95 |
| 6502 Application | £11.95 |
| 6502 Assembly Lang. Subroutines | £19.95 |
| 6502 Development System | £7.50 |
| 6502 Machine Code for Humans | £7.95 |
| 6502 Reference Guide | £9.95 |
| 68000 Assembly Lang. Programming | £19.95 |
| 68000 Machine Code Programming | £13.00 |
| 68000 Programming the | £22.95 |
| 6809, Programming the | £16.95 |
| Art of Music Graphics | £14.95 |
| A User Guide to Wordwise Plus | £9.95 |
| A Young persons Guide to BBC Basic | £5.95 |
| Advanced Disc User Guide | £16.95 |
| Advanced BASIC ROM User Guide | £9.95 |
| **Advanced User Guide for BBC** | £15.95 |
| Advanced Graphics with BBC | £9.95 |
| Assembly Language Programming on BBC Micro | £11.50 |
| Adventure into BBC BASIC | £6.95 |
| Applied Assembly Lang. for BBC | £9.95 |
| Assembler Routines for the 6502 | £7.95 |
| Assembly Language Programming FOR the BBC Micro | £8.95 |
| Assembly Language Programming on the BBC & Electron | £8.95 |
| Basic ROM User Guide | £11.95 |
| Basic User Guide for BBC Micro | £10.00 |
| BBC B Compendium | £5.95 |
| BBC B+ User Guide | £14.95 |
| BBC BASIC for Beginners | £7.95 |
| BBC Forth | £7.50 |
| BBC Hardware Projects | £8.95 |
| BBC Micro & the small Business | £5.75 |
| BBC Micro ROM Book | £10.95 |
| BBC Master 128 High Flyer | £10.95 |
| BBC Micro Advanced Ref. Guide | £10.95 |
| BBC Micro Disc Companion | £8.95 |
| BBC Micro File Handling on | £6.95 |
| BBC User Guide | £10.00 |
| BBC Software Projects | £6.95 |
| BBC Wordprocessor Beginners Guide | £7.95 |
| BBC Within the Micro | £13.95 |
| BCPL User Guide | £14 |
| Complete FORTH | £6.95 |
| CP-M-86 User's Guide | £19.95 |
| CP-M Bible | £16.50 |
| CP-M Handbook with MPM | £9.95 |
| CP-M Plus Handbook | £13.95 |
| CP-M Soul of | £16.50 |
| CP-M The software BUS | £8.95 |
| Creative graphics on BBC Micro | £7.50 |
| Disc Drive Projects for Micros | £5.45 |
| **DISC FILING SYSTEM (DFS) Operating Manual for BBC** | £6.95 |
| Disc Programming Techniques | £9.95 |
| Disc System for the BBC Micro | £6.95 |
| Exploring FORTH | £6.95 |
| FORTH on the BBC Micro | £7.50 |
| Functional Forth for the BBC Micro | £5.95 |
| Guide to BBC ROMs | £9.95 |
| Graphs & Charts on BBC Micro | £7.50 |
| Hackers Handbook - New | £6.95 |
| Interfacing & Robotics on BBC | £15.95 |
| Introduction to COMAL | £9.50 |
| Introduction to LOGO | £6.95 |
| Introducing 'C' | £9.95 |
| Introducing LOGO | £5.95 |
| Introduction to FORTH | £8.95 |
| Introduction to PASCAL | £17.95 |
| ISO-PASCAL Reference Manual | £9.95 |
| LISP 2nd Edition | £14.95 |
| LISP, A Beginners Guide to | £10.95 |
| LISP the Language of Artificial Intelligence | £9.95 |
| Logo Programming | £9.95 |
| **Mysteries of DISC DRIVES and DFS REVEALED** | **£5.95** |
| Mastering Assembly Code | £8.95 |
| Mastering CP-M | £17.95 |
| Mastering Music | £6.95 |
| Mastering the Disc Drive | £7.95 |
| Master Advance Reference Manual | £19.95 |
| Master Reference Manual Part 1 | £14.00 |
| Master Reference Manual Part 2 | £14.00 |
| Micronet Handbook | £6.95 |
| Points of View | £6.95 |
| Programming the 6502 | £16.95 |
| Programming the Z80 | £19.95 |
| Structured Basic | £7.95 |
| Structured Prog. with BBC BASIC | £6.50 |
| The Complete FORTH | £6.95 |
| **The Epson FX-KAGA PRINTER Commands REVEALED** | **£5.95** |
| Turtle Graphics on BBC Micro | £7.50 |
| Using Floppy Discs with BBC Micro | £5.95 |
| View 3.0 User Guide | £10 |
| View Guide | £4.50 |
| Viewsheet User Guide | £10 |
| Viewstore User Guide | £10 |
| Using BBC Basic | £4.95 |
| Wordprocessing BBC Beginners Guide | £7.95 |
| Wordstar & CP/M made easy | £7.45 |
| Wordwise + A User Guide | £9.95 |
| Z80 Applications | £15.95 |
| Z80 Assembly Language Programming | £19.95 |
| Z80 Reference Guide | £9.95 |

## *OFFICE MASTER*




**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21**

(Cassette or Disc)

## *OFFICE MATE*




- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS
- WORD PROCESSOR

**DATABASE** – Set up a computerised card index system with powerful search facilities.

**SPREADSHEET** – Offers many calculation and editing features.

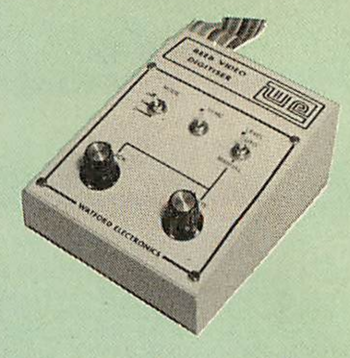
**BEEBPLOT** – Provides visual representation from Spreadsheet data.

**WORDPROCESSOR** – Provides many powerful facilities.

**OFFICE MATE Only £10**

(Cassette or Disc)

## *BEEB* VIDEO DIGITISER




Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

## *Magazine Maker*

(As seen on TV)
A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

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12

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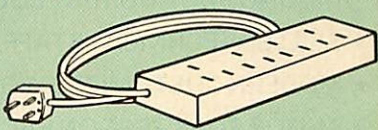
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# RETURN OF THE MANDELBROTS

**Last year we introduced you to the world of fractals and asked for your ideas, here they are**

***Davis Johnson-Davies***

This update follows the article 'Join the Mandelbrot Set' which appeared in the May 1986 issue of *Acorn User*. The original article described programs for exploring the complicated and fascinating behaviour of a mathematical object called the Mandelbrot Set, which gives rise to fractal pictures whose complexity is preserved at whatever magnification they are viewed.

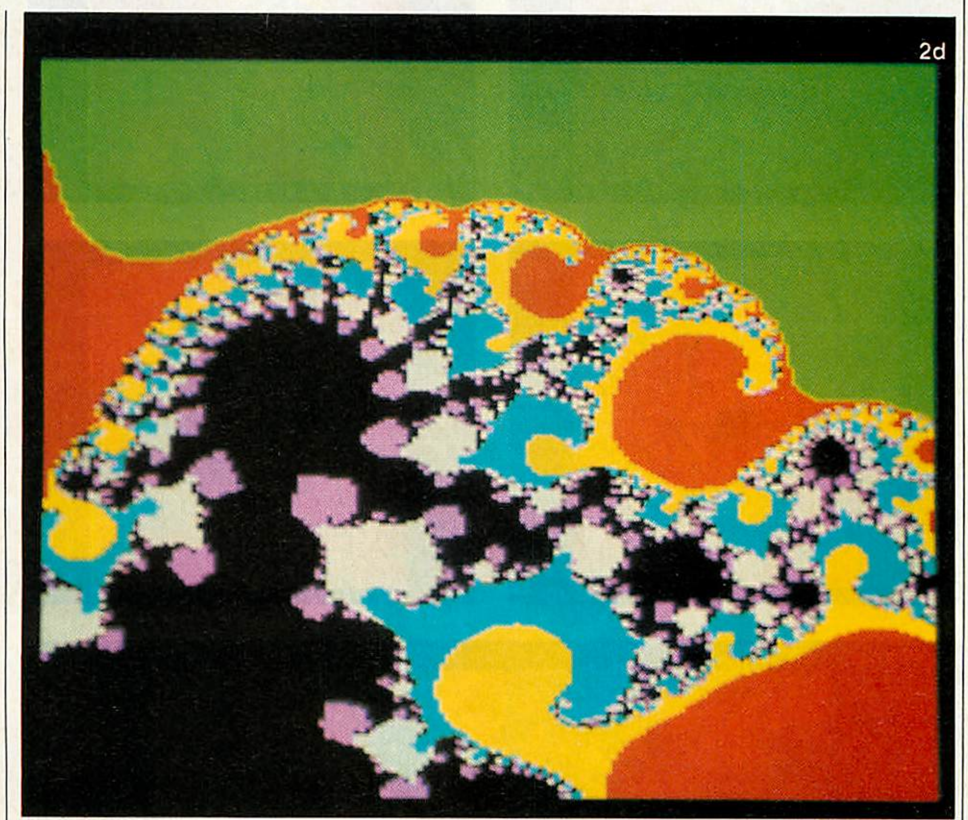
A Basic program to plot a specified area of the set was given in the original article, but several readers have asked for a version written in Acornsoft ISO-Pascal, and so a full listing of an equivalent version is given in listing 1 on the yellow pages. As in the Basic version, this prompts for the values x, y, and s which represent the co-ordinates of the lower left-hand corner of the square area being mapped, and the length of the side, respectively. The Pascal version takes 114 minutes on a Master 128 Turbo to map the area x = 2, y = −1.25, s = 2.5. The program will also work on a normal BBC micro if it is fitted with the GXR ROM.

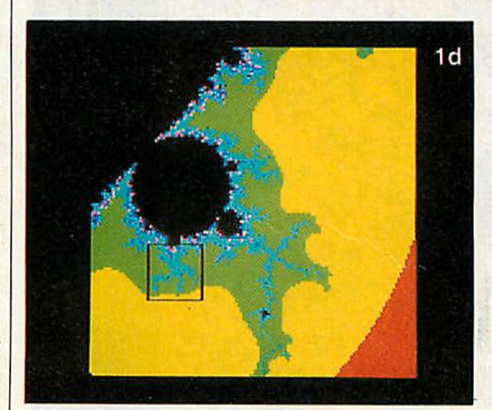
## Readers' photos

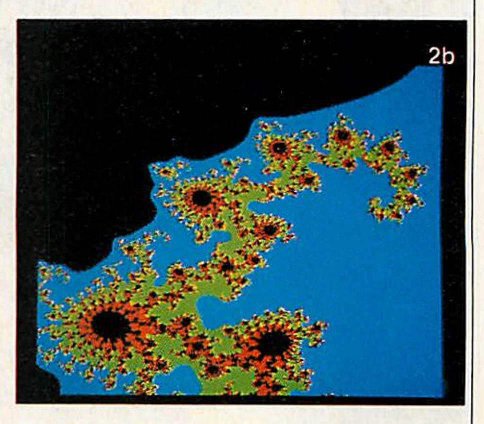
The original article asked for readers to submit any interesting areas of the Mandelbrot Set they had found. These are shown in figures 1 to 6, and the co-ordinates are given in table 1 so you can try them using your own programs.

The first sequence of Mandelbrot screens was obtained by Brian Page of Alloa, Scotland, using the eight-colour version of the Basic program presented in *Acorn User*. Brian did four plots corresponding to the values of the x, y, and s prompts shown in table 1.

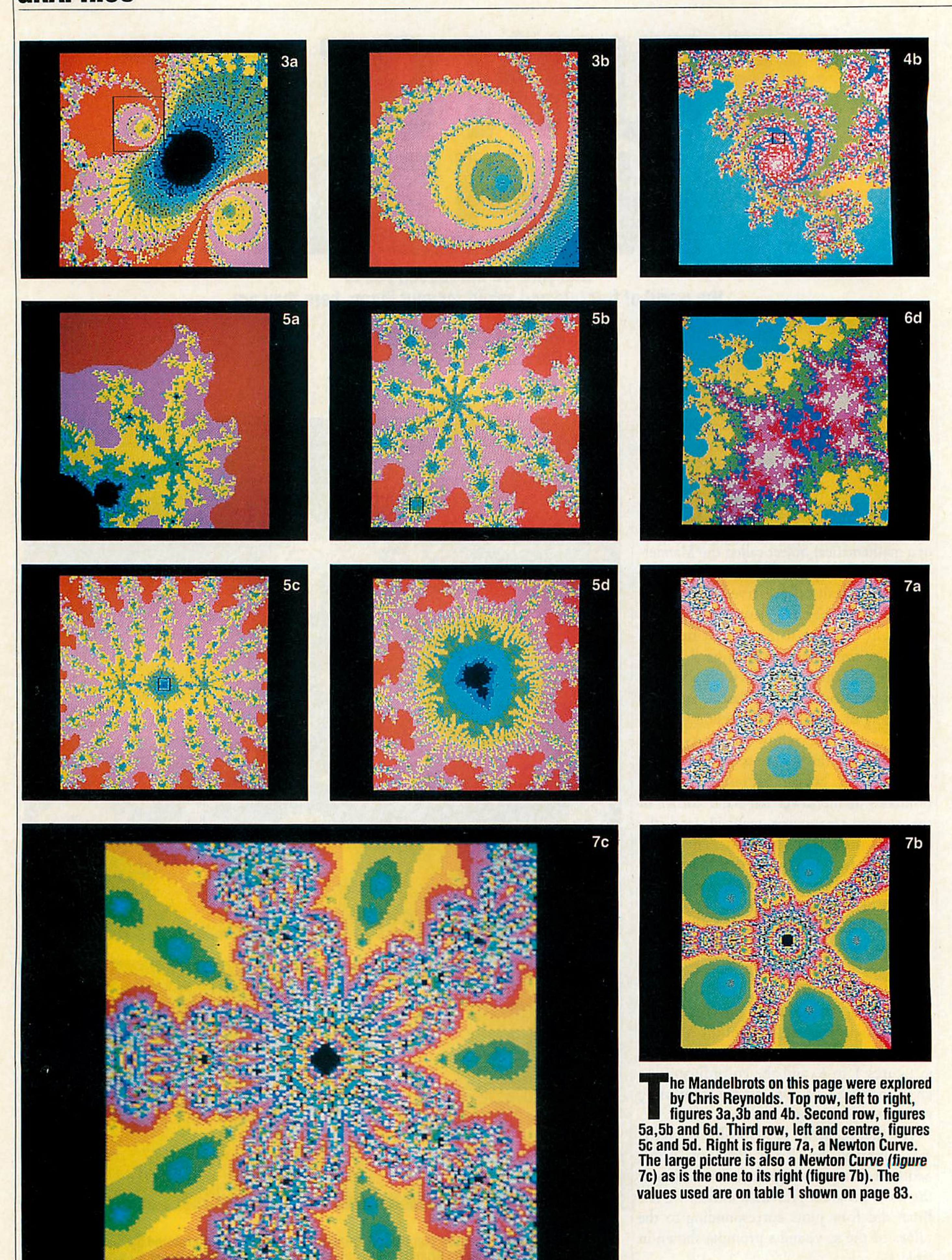
A shot of figure 1d is shown right. The remaining photographs were all obtained




**The above Mandelbrot areas were discovered and explored by readers Brian Page (figure 1d, bottom left) and Bob Hales (figure 2d, top and figure 2b bottom right).**




The Mandelbrots on this page were explored by Chris Reynolds. Top row, left to right, figures 3a,3b and 4b. Second row, figures 5a,5b and 6d. Third row, left and centre, figures 5c and 5d. Right is figure 7a, a Newton Curve. The large picture is also a Newton Curve *(figure 7c)* as is the one to its right (figure 7b). The values used are on table 1 shown on page 83.

with readers' own programs, and they illustrate the effects that can be obtained using different plotting techniques.

The photos shown in figure 2b and 2d were obtained by Bob Hales of Surrey. Each pixel was calculated individually using an assembler routine to speed up execution. The highest resolution screen in figure 2b was obtained using mode 1. Bob's other screen uses mode 2, and the data for the plots are in the table below.

Finally, the figures opposite show four sequences of pictures obtained by Chris Reynolds of Herts. These formed part of an impressive animated demonstration based on Mandelbrot figures, which he prepared for a computer images exhibition at Brunel University in Middlesex in May 1986, and he has subsequently sold prints of these images in aid of MIND, the mental health organisation. One technique used in the demonstration was to animate the plots by rapidly reprogramming the palette. With this technique, Mandelbrot patterns can be made to beat like hearts, and spirals turn into catherine wheels.

The two screens of figure 3 show an exciting area deep down in the central crevice of the Mandlebrot Set, revealing an almost perfect spiral. Figure 4 shows an eight-armed spiral, and the four screens in figure 5 show a nine-armed star at the centre of which is a minute replica of the whole Mandelbrot Set.

The last series in figure 6 shows another strange region of the set, culminating in the tiny area in the last picture which is seen at a magnification of five million times!

The parameters for these plots are all given in table 1.

Readers interested in obtaining a copy of Chris Reynolds' original exhibition demonstration disc should write to him at CODIL Language Systems, 33 Buckingham Road, Tring, Herts HP23 4HG.

A good description of the Mandelbrot Set appears in Benoit Mandelbrot's book, *The Fractal Geometry of Nature,* published by Freeman & Co. There is a discussion of iterated functions like Newton's Curves in chapter 16 of *Metamagical Themas: Questing for the Essence of Mind and Pattern* by Douglas Hofstadter from Penguin.

*Acorn User* has carried several articles on fractal graphics in the past: Susan Stepney introduced fractals and the Julia Set in October 1983 and March 1984, and Kim Aldis described a fractal curve generator in October 1985. *Personal Computer World* carried an article describing the Mandelbrot and Julia Sets in December 1986.

## Newton Curves

Another class of fractal plots based on the complex cube roots of −1, were described in 'Back to the Roots' in the July 1986 *Acorn User.* These did not provide quite such scope for exploration as the Mandelbrot Set, but the article concluded with a number of unanswered questions which open up interesting possibilities for further investigation.

The first question was whether interesting curves could be obtained from roots other than the cube roots of −1. The square case, $z^2 = -1$, is very uninteresting, but higher-order roots give beautiful and symmetrical curves. The contour plots for the equations $x^4 = -1$ and $x^5 = -1$, are shown in figure 7a and 7b respectively for x=−1.5, y=−1.5, and s=3.

For those who missed the original article, each point on the curve is coloured according to how many iterations of the Newton–Raphson method are needed to get from that starting estimate to within a certain accuracy of the complex root of the equation. The four circular areas in figure 7a and the five circular areas in figure 7b surround the roots themselves. The highly-convoluted patterns between the roots represent regions of 'indecision', initial estimates in these regions take many more iterations before finally converging on one of the roots.

**PARAMETERS**

| | x | y | s |
|---|---|---|---|
| 1 (a) | 0.2 | −0.7 | 0.3 |
| 1 (b) | 0.252 | −0.63 | 0.05 |
| 1 (c) | 0.2603 | −0.6154 | 0.005 |
| 1 (d) | 0.2619 | −0.6129 | 0.0015 |
| | x | y | s |
| 2 (a) | −0.73753 | 0.21187 | 0.02491 |
| 2 (b) | −0.73753 | 0.27141 | 0.1 |
| 2 (d) | 0.295 | −0.02 | 0.0050 |
| 2 (e) | 0.2985 | −0.019 | 0.0015 |
| | x | y | s |
| 3 (a) | −0.74995 | 0.02015 | 0.0001 |
| 3 (b) | −0.749925 | 0.020203 | 0.000025 |
| 4 (a) | −0.373 | 0.597 | 0.01 |
| 4 (b) | −0.3725 | 0.602 | 0.0035 |
| 4 (c) | −0.37097 | 0.60393 | 0.0018 |
| 4 (d) | −0.37096 | 0.60398 | 0.00005 |
| 5 (a) | 0.33 | 0.41 | 0.04 |
| 5 (b) | 0.3519 | 0.42165 | 0.0005 |
| 5 (c) | 0.35199 | 0.421685 | 0.000035 |
| 5 (d) | 0.35200625 | 0.4217015 | 0.000002 |
| 6 (a) | 0.403 | 0.144 | 0.005 |
| 6 (b) | 0.405595 | 0.14742 | 0.00005 |
| 6 (c) | 0.40561 | 0.147445 | 0.0000025 |
| 6 (d) | 0.40561135 | 0.14744615 | 0.0000002 |

This table shows the values for x, y and s used by readers to explore the Mandelbrot Set. The figures are illustrated left and on page 81.

**Table 1. Variables for the Mandelbrot plots**

In the case of the fifth roots the equation to be iterated is shown in the box below.

The Basic program to obtain these roots, listing 2, is a version of the cube-root program given previously in listing 2 of the original article.

$$w = (x,y) = z - \frac{z^5 - 1}{5z^4}$$

$$= \frac{4z^5 + 1}{5z^4}$$

One problem when using the same program to explore higher order roots is that the numbers can become very large during calculations, and the exponential range of BBC Basic may be exceeded giving the 'Too Big' error message. A test is needed to stop iterating before this happens.

The maximum size of number that BBC Basic can handle is 1E38; since we are raising z to the fifth power, 1E7 is the largest number that we can safely allow. Points which exceed this value are plotted in black (N%=0) in line 430.

A final suggestion made in the original article was to explore the effect of adding a constant m in the Newton–Raphson equation so that it becomes:

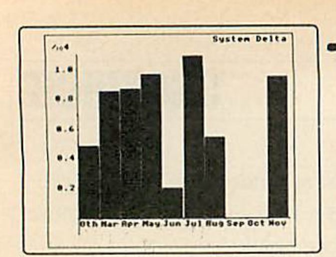
$$k = j - \frac{mp\ (x)}{p'\ (x)}$$

The effect of adding a constant m = 1.5 is shown, for the fifth roots, in figure 7c; the areas of 'indecision' are increased, and the regions around each root reduced, to give an even more intricate pattern.

## The Beauty of fractals

Finally, a book published at the end of last year should be of great interest to all those who enjoyed these articles. *The Beauty of Fractals,* by H O Peitgen and P H Richter (Springer-Verlag) describes both the Mandelbrot Set and the Newton Curves, among other fractal-generating equations, and gives sufficient details to explain how all such curves can be programmed. The best feature of this book is its collection of 184 figures, many in beautiful high-resolution colours. Its worst feature is its price, £28.60, which may put it beyond all but the most committed fractal explorer.

*Turn to the yellow page index on page 113 for details of the Mandelbrot listings.*






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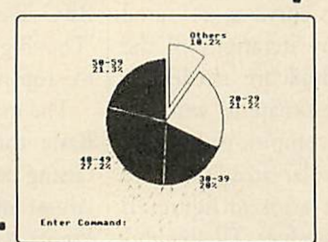
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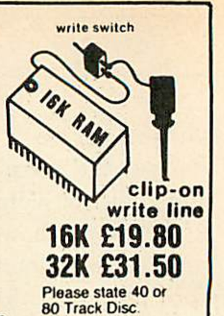







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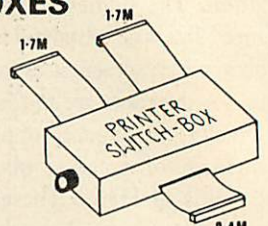

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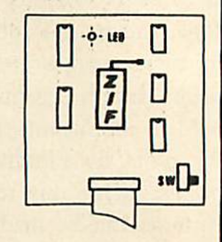
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**TABULATIONS:** CROSS-TABLUATION: Two-way tables with col and row totals and percentages. CHI-SQUARE CONTINGENCY TABLE: Observed freq, exp freq and chi-sqr for each cell. Col and row sums, overall chi-square stat and its significance level. Yates correction.

**HIGH RES PLOTS:** All plots can be dumped on the printer. PLOT OF BIVARIATE REGRESSION: Scatter diagrams with optional line of best fit, intercept, slope, R2, std error. CURVE FITTING: Fitting of polynomials on bivariate data. Fitted polynomial coeff, R2 and std error. TIME SERIES PLOTS: Simultaneous plotting of up to 7 columns of data against time. PLOT OF FUNCTIONS: Simultaneous plotting of up to two functions, integrals, polynomials and roots of polynomials.

**DEFAULT SETTINGS (For BBC version):** Choice of screen and device control parameters. 40 or 80 column display, number of data drive 0/1/2/3, black & white or colour monitor width of printer, high-res screen dump command, maximum formula length, maximum number of columns and rows depending on free RAM.

## LINTPRO **Linear/Integer Programming Package.**

Written by Dr D. Sprevak

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## CPA **Critical Path Analysis**

Written by Dr J. S. Dean

A comprehensive coverage of critical path analysis sufficient for most practical applications. Activities and durations are supplied as input and earliest and latest start and finish times for each activity, total float and critical path are obtained as output. Easy editing of inputs provides the possibility of analysing the sensitivity of solutions. A built-in calendar can give dates to any programme. Resources can be allocated to each activity. Suitable smoothing scheme is chosen and a resource bar chart is drawn. Results can be directed to printer or to text files. High-res plot of the node structure can be dumped on printer.

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# ROLLICKING ROBOTS

**We take a look at some bell-ringing robots which can be used to play tunes**

**Joe Telford**

Getting robots to play tunes can be a messy business. Then I hit upon the brilliant idea of simulating it in Basic. It all started early one morning . . .

Bong! Breakfast time at Telford Towers. I strolled down the main staircase, noted the precision with which the robot arm was striking the gong and entered the banqueting hall. 'One of the best days' work I ever did', I remarked to her ladyship. She looked up briefly from her share brochure. 'Yes dear, very nice!' She looked back at the latest missive from her stockbroker, an offer to take up a further 20 per cent of shares in Marks and Spencer. Such wheeler-dealering was beyond me, though I was wondering of late where all my *Acorn User* cheques were going.

Bong! Bong-ong-ong! Bong-ong-ow! Me-Bong-ow! Crash! I dashed back through to the entrance hallway, and witnessed an amazing sight. The robot arm had abandoned its task of striking the dinner gong and was knocking several bells out of the Telford Towers' tabby instead. The sight of a rather dazed cat swinging on the end of a robot arm was not pleasant. I heard a chuckle from the laboratory where the arm's brain was located (a rather neurotic BBC model A with bits added) and I swiftly identified the culprit as my darling daughter.

Her excuse was she had to compose some music for school, and had mistakenly thought that a computer would provide the instant solution. After a few heartstopping moments at the control panel, the robot arm deposited our moggy on a chandelier, rang for breakfast on a piece of Wedgewood (which disintegrated) and finally returned to Bong-ong-ong! Then quietness.

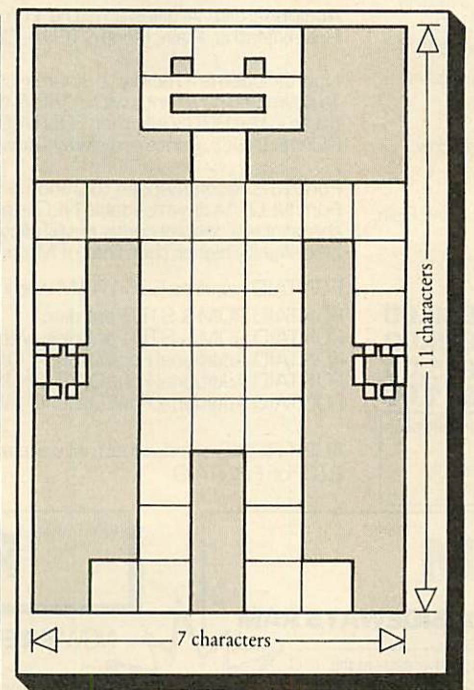



**Figure 1. Full sized robot design**

After breakfast we had a little discussion about robots and safety. Unfortunately Isaac Asimov's Three Laws of Robotics have yet to be written into every robot system, and I explained that robots improperly programmed could cause no end of trouble. What we needed was a secure environment for handling robots and thence exploring musical composition.

## The plan

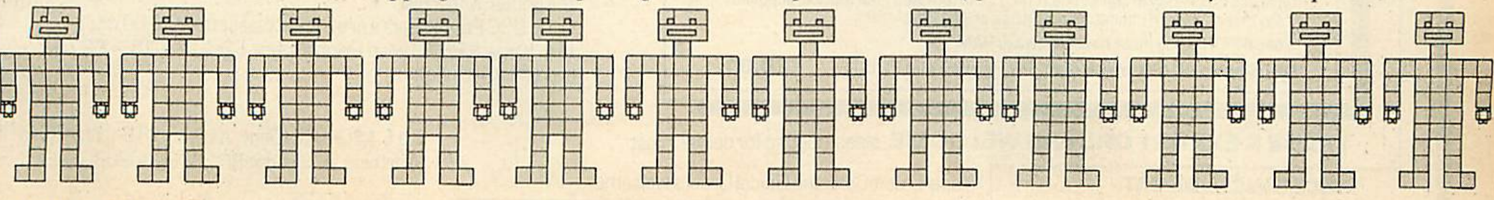
My initial plan was to design a microworld which could be built up by having a base program, onto which other bits could be added. One of the other bits would allow quite young children to explore the microworld, but there would be enough material for more sophisticated users to build a real system into the package. This being the case my three stages of development were:

- A program to display the necessary screen information and set up the initial program variables.
- A program with a range of procedures which would allow users to write tunes for the robots to play, using Basic.
- A simple music writing program with facilities for making and performing music. Again this could be extended by users, or simply used as it stands.

## Problems solved

The first program begged several questions. First, how many robots would be manageable? Second, how would they appear to make noises, or better still music? And finally, how would we maintain the initial screen once the next program had loaded?

I decided the easiest way to build the robots would be via user-defined graphics, and so I laid out a plan of a typical robot on paper. From figure 1 you can see that the style of the robot is very simple. Although I wanted to make the creatures more sophisticated, the end users (a bunch of nine-year olds) decided that my prototypes were more friendly. The requirement



for speed of movement meant that the arms had to be easily manipulated, and I decided to stay with whole character graphics because of this. The end result was that the typical robot remained seven characters wide. We end up with five robots across the screen as we have to allow for the spaces between robots.

The next decision was easy. Each robot could be allocated one sound or two sounds. Five musical tones seemed insufficient, whereas 10 covered an octave with two notes to spare. I decided to allocate one sound to each hand of each robot. But how would that sound be realistically generated? The solution came in a flash! Just as the Telford Towers robot arm struck a gong every mealtime, these rollicking robots would strike a gong. One gong to each hand. Problem. How would we show the gong being struck? Could it vibrate? That idea was tried without success, then a sudden thought. Why not strike a bell? If a robot hand hit the clapper of a bell, then the clapper could be moved to the side of the bell to make a noise. Bell characters were easy to design, using definable graphics.

In a short space of time we had a screen design, as shown in figure 2. The title of The Rythmical Rollicking Robots came from Kathryn, though I suspect such creatures must be abound in such computing mags as *The Beano* and *The Dandy*, which form her staple literary diet.

## The *RSCREEN* program

The first program is shown in the yellow pages as *RSCREEN*. Type it into your micro (it should work happily on everything). Then save it as RSCREEN. Set up a !BOOT file (figure 3) and you will be able to Shift-Break into it. Remember, *RSCREEN* only sets up the screen and a few transferable variables. It does nothing

```
*BUILD !BOOT
0001 *BASIC
0002 MODE 1
0003 CHAIN "RSCREEN"
0004
ESCAPE
*OPT 4 3
```

**Figure 3. Setting up a !BOOT file**




**Figure 2. The five bell-playing robots**

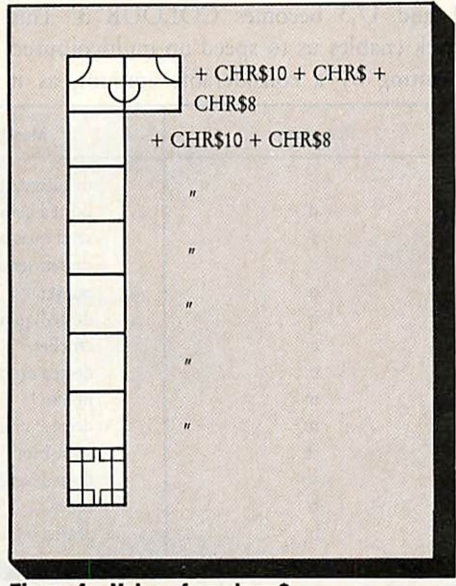



**Figure 4a. Value of armdown$**

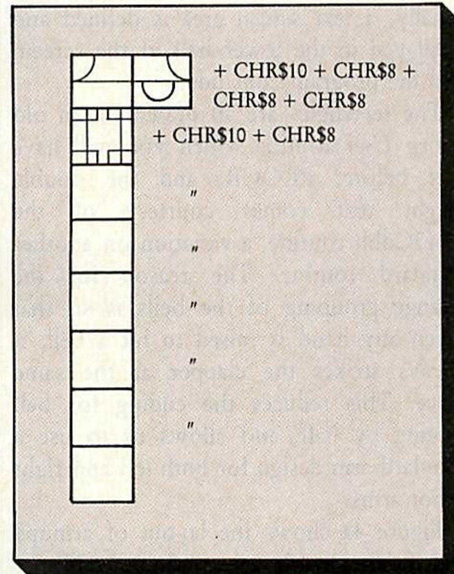


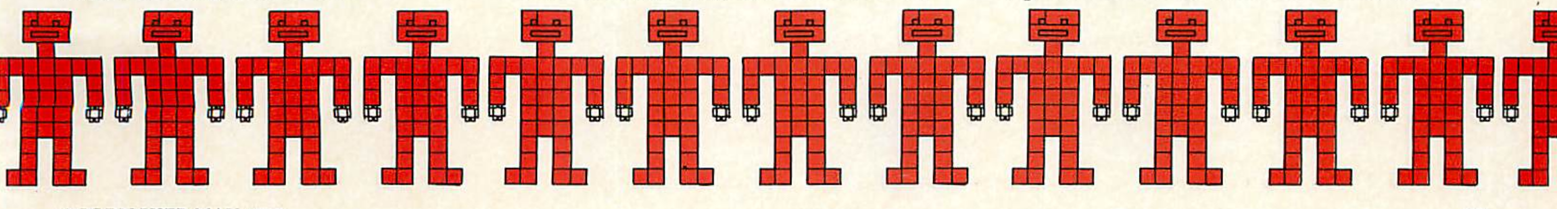

**Figure 4b. Value of armup$**

else. To go further we need the second program. Before we look at this, let's investigate the contents of *RSCREEN*.

## Inside *RSCREEN*

*RSCREEN* has four major components: PROCbuildrobot, PROCbuildbells, PROCbuildarms, and PROCscreen.

**PROCbuildrobot:** This procedure defines characters from 128 to 134 inclusive, to be assembled into the component parts of each robot. The hefty data lines within the procedure are read into a string called 'robot$' and by using PRINT robot$, a complete robot can be displayed in one print statement. Note that the last item of



the data lines is a zero which acts as a rogue value to indicate the end of the data.
**PROCbuildbells:** This procedure is identical to the last one except that the user defined characters are assembled to make bell shapes.
**PROCbuildarms:** There are two arm positions represented by the strings 'armup$' and 'armdown$'. These are both assembled as the previous procedures. Unlike the previous procedures however, both armup$ and armdown$ will not be displayed by this program. Instead, they are stored in memory at location &900 to await use by a following program. This demonstrates how an area of memory below PAGE which is not used by the operating system can be pressed into service to transfer strings between programs.
**PROCscreen:** This is the main program routine which designed the screen robots as illustrated in figure 2. It first draws a filled rectangle at the top of the screen and prints the title 'The Rhythmical Rollicking Robots' inside it. Next it draws a similar rectangle at the bottom of the screen. Then the 10 bells are drawn, and the five robots. Finally, a text screen area is defined and displayed in the lower half of the screen, and the program concluded.

The rectangles are all drawn by an old *Acorn User* routine which you will have met before, PROCR, and the double height text comes courtesy of the PROCdbh routine, a variation on another standard routine. The reason for the strange grouping of the bells is so that when any hand is raised to hit a bell, it always strikes the clapper at the same place. This reduces the coding for bell ringing by half, and allows us to use a standard arm design for both left and right robot arms.

Figure 4a shows the layout of armup$ and figure 4b shows armdown$. Notice that both arms include the lower part of a bell as their first printable characters. Printing armup$ in the correct screen location will result in the appropriate bell clapper apparently being knocked to one side, while the original hanging arm is erased by the space characters in the armup$ procedure. The armdown$ string prints the bell clapper in its central position again and then erases the upward pointing arm and then draws a hanging arm in the normal resting place.

## Colour with COLOUR

Because the bell is yellow, the robot is red and its hands are white, there is a problem involved in printing multi-coloured strings. Normally this would be done with code as in figure 5 below.

```
COLOUR 2 : REM yellow
PROCprintbell
COLOUR 1 : REM red
PROCprintarm
COLOUR 3 : REM white
PROCprinthand
```

**Figure 5. Printing multi-coloured strings**

However, in this case we simply use PRINTarmdown$. If you look carefully at PROCbuildarms you can see that there are some control characters embedded. The ones which interest us are the 17s. Wherever you see a 17,2 this is translated as CHR$17+CHR$2 which is interpreted by the BBC micro's VDU drivers as COLOUR 2. Similarly 17,1 becomes COLOUR 1 and 17,3 becomes COLOUR 3. This trick enables us to speed up multicoloured printing by a considerable amount, as it saves on the time needed to translate COLOUR n to VDU17,n.

## Music and movement

Program 2 in the yellow pages is called *ROBDATA*. It demonstrates how Basic programs can be written to interpret musical data written in data statements. First, enter the program and save it as ROBDATA. The code you might wish to alter is line 160. Changing the data here will change the tune which is played which must be between one and 10 inclusive. The second is the time value which must be one of: d,s,q,c,m,sb,b and may optionally have a '.' in front of it eg, .d, or .sb. Figure 6 shows how the arms are numbered and how that relates to pitches. Figure 7 indicates the meaning of the time values and the numbers returned. These numbers are actually centiseconds and can be modified by the user to suit. In this way the speed of the melody can be altered as required.

| Bell | Robot | Arm | Pitch |
|---|---|---|---|
| 1 | 0 | 1 | B. |
| 2 | 0 | 2 | C |
| 3 | 1 | 1 | D |
| 4 | 1 | 2 | E |
| 5 | 2 | 1 | F |
| 6 | 2 | 2 | G |
| 7 | 3 | 1 | A |
| 8 | 3 | 2 | B |
| 9 | 4 | 1 | C' |
| 10 | 4 | 2 | D' |

**Figure 7. How the arm numbers relate to pitch**

| Parameter | Meaning | Time value/centisecond |
|---|---|---|
| d | demisemiquaver | 2 |
| .d | dotted demisemiquaver | 3 |
| s | semi quaver | 4 |
| .s | dotted semiquaver | 6 |
| q | quaver | 8 |
| .q | dotted quaver | 12 |
| c | crochet | 16 |
| .c | dotted crochet | 24 |
| m | minim | 32 |
| .m | dotted minim | 48 |
| sb | semi-breve | 64 |
| .sb | dotted semi-breve | 96 |
| b | breve | 128 |
| .b | dotted breve | 192 |

**Figure 6. Arm numbering in relation to time values**

## *RSCREEN* and *ROBDATA*

With *RSCREEN, ROBDATA* and *!BOOT* on the same disc, press Shift-Break and the *RSCREEN* program will load and run. Once run it exits and leaves the traditional '>' prompt. Type CHAIN "ROBDATA" and press Return. *ROBDATA* will load and run with whatever data you have

entered. As it plays the robots will move their hands to ring the bells in sequence with (and apparently generating) the music. Change the data and hence change the tune being played.

Pressing Escape will stop *ROBDATA*

```
*KEY 0 PROCk(1,"d")|M
*KEY 1 PROCk(2,"d")|M
*KEY 2 PROCk(3,"d")|M
*KEY 3 PROCk(4,"d")|M
*KEY 4 PROCk(5,"d")|M
*KEY 5 PROCk(6,"d")|M
*KEY 6 PROCk(7,"d")|M
*KEY 7 PROCk(8,"d")|M
*KEY 8 PROCk(9,"d")|M
*KEY 9 PROCk(10,"d")|M
```

**Figure 8. Sets up function keys for bells**

and return the '>' prompt. At this point we can set up a simple bell keyboard on the function keys. Just type in the lines in figure 8 above.

Now press any function key except Break and the robot hand matching that red key will ring its bell. With hardly any effort at all very young children can explore the ringing of combinations of bells.

## Procedures in *ROBDATA*

**DEFPROCgetarms:** this extracts the armup$ and armdown$ strings from page &900, and opens the whole screen with a VDU26 to prepare for the arm movements.

**DEFPROCmakebells:** This procedure dimensions 10 bells and allocates a pitch code to each to fit the definition of a major scale in C. The parameter defines the key note. So 100 is C, 108 would be D, 120 would be F and 128 would be G. The definition of the scale is in the data statement in this procedure, and follows the approach below:

SEMITONE, TONE, TONE, SEMITONE, TONE, TONE, TONE, SEMITONE, TONE

which defines a major scale starting one note below the tonic and ending one above the tone, one octave higher.

This line must be changed in the follow way if you wish to work in a minor key:

*580 DATA 4,8,4,8,8,4,12,4,8

**DEFPROCexit:** This procedure preserves the robot screen when Escape is pressed, or when an error occurs.

**DEFPROCplay:** This procedure uses FNrdur to decode the time value, and decodes the arm number into a robot arm number paid and finally calls PROCrding to synchronise movement and sound.

**DEFFNrdur:** This function returns a numerical value matching the string input to it as show in figure 7.

**DEFPROCrding:** This procedure sequences four actions which represent:

1) PROCprintarm: (...'U') Raise arm
2) PROCsoundon: Make sound
3) PROCwait: Wait will time interval up
4) PROCprintarm: (...'D') Lower arm

**DEFPROCprintarm:** Raises or lowers the selected arm

**DEFPROCsoundon:** Generates a bell-like tone using two voices

**DEFPROCwait:** Wait for a specified delay

**DEFPROCsoundoff:** Muffles the bell currently chiming

**DEFPROCrrest:** Uses PROCsoundoff then waits for the specified time

**DEFPROCk:** This procedure is intended to be used only from the front screen and allows the sounds to be explored by manually typing in sequences of PROCks. It is set up to switch between the text windows play notes and animate the robot arms. Its parameter list is simply arm (one to 10) followed by time value as per figure 7. So from the text window a simple sequence could be entered:

FOR x=1 TO 2:PROCk (4,"c"): PROCk (3,"c"): PROCk (2,"m"):NEXT

It is possible to delete the *ROBDATA* coding between lines 90 to 150 and replace it with direct access commands. Although it won't suit musicians, a typical alteration is listed below:

90 REPEAT
100 FOR n=9 TO 2 STEP -1: PROCplay(n,"c"):NEXT
100 UNTIL FALSE

Musicians if anything will wish to go further away from Basic towards conventional notation. The last program offered here is a halfway house. It is program 3 in yellow pages, and is called *ROBLANG.* Type it into your micro and save it as ROBLANG. It can be reloaded and run from *RSCREEN* by typing CH."RSCREEN" then at the next ">" prompt, CH."ROBLANG".

Once *ROBLANG* is running you are offered a choice of the following options:

(N)ew...ie, clear memory
(E)nter...ie, enter music
(S)ave...ie, save to a disc file
(A)uthor....ie, set up title and author for the current piece
(T)empo...ie, change tempo
(L)oad...ie, load music from disc
(P)lay...ie, play the current piece with robots on bells
(Q)uit...ie, return to Basic

Most of these are self explanatory and have supportive messages if you do something wrong or don't understand. The six major points are itemised below:

**New:** Only press N if you really mean to. If you should press N then the program tells you (for example is you wish to load a new piece of music).

**Enter:** The notes are entered in ordered pairs of arm number one to 10 then time value as per figure 7. Exit this section by pressing Escape. Enter without the first 'new' appends data to the end of your current piece up to a maximum of 100 notes. Alter this maximum by changing the 'DIMs' at the program start.

**Save:** You can't save to a file which already exists. Format for save is all PRINT#, with title, author and number of notes as records one, two and three. The ordered pairs of notes and time values then follow.

**Load:** Simple protection from nonexistent files. Be careful not to load Basic programs by mistake.

**Play:** Lets you play a piece any number of times, so for example, verse plus chorus is entered once and then played as often as required by the user.

**Tempo:** The base tempo is two. A tempo of one will be twice as fast, while a tempo of a four will be twice as slow.

## Inside *ROBLANG*

The only new procedures are as follows: PROCtitle, PROCtempo, PROCenter, PROCsave, PROCload, and PROCp which plays the whole tune. These are generally easy to use and follow, and the investigation of these routines is left to interested readers.

So go to it. Get those robots rollickin'!

*Turn to the yellow page index on page 113 for details of Joe's robot listings.*

# HAPPY EVER AFTER

**Not all hardware and software live happily together. Find out how to avoid the pitfalls**

*Manek Dubash*

Flexibility is the cornerstone of the BBC micro's design philosophy; its successful realisation has spawned a vast range of software and peripherals. Indeed, the machine's versatility is an incentive to exploit its potential. But being jack of all trades has its weaknesses as well as strengths. Many BBC micro owners discover too late that a new peripheral or program, long saved up for and eagerly awaited, transforms a harmonious machine into a site for civil war between its components. It's called incompatibility and it can happen to anyone.

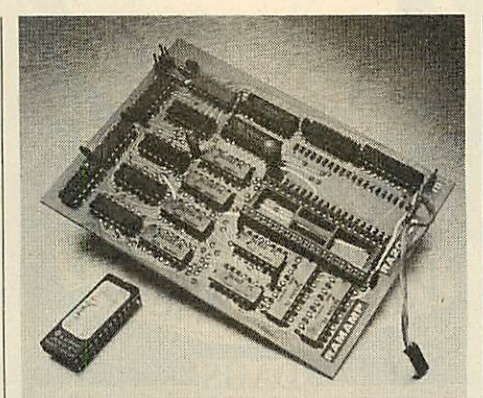
So, if you are planning a purchase, how can incompatibility be avoided? If you already have a problem, can you get round it? We will look at a typical BBC machine and see what sort of problem we are talking about.

Wordprocessing is the most common reason for buying a BBC micro so, on lifting the lid, we will probably find *View*, *Wordwise* or maybe *InterWord* in a ROM (read only memory) chip.

Acorn's earlier disc filing systems (DFSs), versions 0.9 and 1.20, lacked the *FORMAT and *VERIFY commands, then standard on other makes, so people tended to look elsewhere. Although this was rectified from version 2.0 in the BBC B+, non-Acorn DFSs remain popular due to the inclusion of extra utilities, so it is quite reasonable to expect one in our imaginary micro.

Keeping the lid open, we find a sideways ROM or shadow RAM board, possibly a communications ROM such as *Commstar*, a toolkit, say Clare's *Ramrod* or the *Advanced Disc Toolkit* (ADT), and a font or printer dump ROM.

With such a pot-pourri of equipment from different makers, there are bound to be clashes. Most companies try to make add-ons compatible with equipment likely to live in the same machine but their assumptions can't cater for every eventuality, as manufacturers all jostle for space in the computer. The price of extra facilities is bound to be some degree of incompatibility. The key is to decide what you want first and then choose the item least likely to cause hassles.



Boards add memory, but a second might not fit

PHOTOGRAPH BY CHRIS BELL

The first problem with ROM chips is there is often a clash of command names. A common command is *EDIT, found in Watford's DFS and in Solidisk's Manager ROM, to name but two. Manufacturers usually avoid clashes by including an optional, single letter, command prefix but some prefixes are more popular than others: 'Z' is one such prefix. Manufacturers ought to consider introducing two letter prefixes such as 'WE' for Watford Electronics, and so on.

Command name clashes are not the only complication. Some ROMs grab memory workspace for themselves, so it can be crucial whether existing chips use areas also needed by a prospective purchase. Sometimes the workspace may be a few bytes in zero page, sometimes whole pages can be swallowed up – Acorn's GXR is a case in point. To find out, type PRINT~PAGE and, if the result is higher than without the ROM, programs may need to be downloaded or the GXR's workspace can be reclaimed if need be with *NOGXR. But if two ROMs are claiming those precious few spare bytes in zero page (locations zero to 255 in the computer's memory) and they do so simultaneously, it can result in a seemingly inexplicable crash.

To avoid such mishaps, Acorn's rules stipulate which areas software may occupy. Sadly, that alone does not guarantee compatibility. For example, Solidisk's ADFS shares its workspace with *ViewStore*'s utilities and both claim to be 'legal'. Only if the two ROMs will not be working simultaneously, or one of them can be temporarily disabled, can peace between them be guaranteed. Even so, 'legal' problems are less likely to create conflict.

Unfortunately, the Master is a more fussy micro than the BBC B about the format of its ROMs and will not, for example, run earlier versions of *Commstar*, although versions of *Commstar 1* released in 1986 work. The problem has since been solved by the release of the Master and Compact compatible *Commstar 2* and, since the arrival of the Master, many other programs have been rewritten to work with all BBC machines, including the *Advanced Disc Toolkit* and *Investigator, Ramrod* and *InterWord*.

Finally, many ROMs will not work with a second processor. For example, none of Computer Concepts' *Inter* family operate with a second processor as there is no provision for 32k languages. The list of second processor incompatible ROMs is long: among them are AMX's *Pagemaker*,

*Commstar*, Le Modem, *Wordwise*, *Sleuth*, and System Delta. A full list is on Prestel's Viewfax/Tubelink, page 258 onwards.

## Disc filing systems (DFS)

A manufacturer has an interest in making his DFS Acorn compatible, so most do cope with the majority of programs. Even heavily protected discs such as Level 9's adventures and Domark's *Trivial Pursuit* run with most DFSs provided they use Intel's 8271, single density only, floppy disc controller (known as an FDC).

So single density DFSs are compatible with each other, in that they use the same format of 10 sectors per track. However, they try to improve on Acorn's original, say, by permitting more files than Acorn's 31 by adding extra catalogues. The trade-off is that any additional files can only be read using the same DFS so, if portability is important, stick to Acorn.

The aggravation really begins with double density boards, which use the newer, Western Digital 1770 floppy disc controller chip. Acorn's late arrival on the double density scene has resulted in manufacturers producing different and mutually incompatible double density DFSs (DDFS): Solidisk's lays down 16 sectors per track (Acorn's format), whereas Watford's use 18. As a result, many programs will not run in double density. Particularly, many disc protection methods address the 8271's registers, and it takes cunning programming to emulate them when using the 1770 and is often impossible.

The best answer is to check with the DDFS manufacturer and the software house. Alternatively, there are disc interfaces on the market which incorporate both types of system and allow the user to switch between them at will.

## RAM and ROM boards

Incompatibility is more probable with a ROM board – there is after all only so much space inside a BBC micro. Hassles can arise with the need for two boards, one for ROMs and one for shadow RAM. To deal first with users of RAM boards who want more ROM space, the Aries B32 RAM board works only with the companion B12 ROM board, and the Aries B20 RAM board will not fit if either Watford's ROM/RAM card or the ATPL Sidewise ROM/RAM board are present (table 1).

If you already have a ATPL board and you want shadow RAM, Watford's 32k RAM board is the one to go for, as the Aries B32 is too big to fit. Owners of Solidisk's old-style sideways RAM can't use the Watford 32k as the two occupy the same logical area in the micro. An alternative is an external ROM box, which at least will not generate head-scratching uncertainty about whether there is room for another internal peripheral.

RAM boards considered on their own cause fewer problems. One exception is the much publicised inability of *View* A2.1 to scroll in most shadow memory, a fault cured in the Aries B32 by a simple star command. Here we have the interesting situation of non-Acorn hardware being more compatible with Acorn software than the BBC B+! On the other hand, *InterWord* works with all shadow RAMs.

| Sideways RAM/ROM | Shadow RAM boards: Aries B20 | Aries B32 | Watford 32k |
|---|---|---|---|
| Aries B12 | yes | yes | no |
| ATPL, Sidewise | no | no | yes |
| Watford ROM/RAM | no | no | yes |
| Solidisk SWR (old style) | yes | yes | no |

**Table 1. Compatibility of shadow RAM and sideways RAM/ROM boards**

Other boards may cause unexpected problems some time after purchase. Solidisk's 32-128k RAMs prohibit output from the user port as, to switch RAM banks, they monopolise the chip that controls the port's output. Thus the computer can read but not write to it. A mouse will work, as the computer expects only to read it, but devices such as Technomatic's real time clock, *Time Warp*, will not.

To avoid such headaches, peripherals like Solidisk's 4-Meg board may be worth considering. Incorporating shadow RAM, sideways RAM and ROM sockets, the device takes the computer to its maximum capacity of 16 ROM images and obviates the need for another board.

This has necessarily been a very short tour round the complex area of expansion boards so, once you know what you need and have narrowed down the choice to a handful of products, a call to the manufacturer repays dividends.

A common activity for BBC micro users is transferring tapes to disc. Many use devices such as Vine Micros' Replay. Vine claims it will transfer almost anything but the cost is a clash with ROM and RAM boards, and some games such as Ultimate's *Nightshade*. A hybrid soft/hardware device, Replay is incompatible with Computer Village, Aries B12, Solidisk 4-Meg and Midwich boards. It also occupies the same physical space as Solidisk's earlier sideways RAMs, and Vine says the software will not run in sideways RAM. Among the games needing a software patch to run with Replay is Micropower's *Dr Who*. Vine will advise on problems.

## B+ and the Master

Incompatibility has caused much wailing and gnashing of teeth since the release of the BBC B+, Acorn's first home micro to use the 1770 FDC. Consequently, many programs for the B would not load due to disc protection designed for 8271-based machines. Acorn does, however, offer a free DFS upgrade, from version 2.0 to 2.2, which promises 8271 emulation and an answer to many protected discs.

As far as the Master is concerned, Acorn tried not to upset their vast user-base and kept it as upwardly compatible as possible but provision of extra facilities dictated major alterations. The good news is that the new 65C12 Master processor chip includes the old 6502's instruction set and so is fully compatible at machine code level. However, without its 1770 disc controller, the Master could not run the double density advanced disc filing system, so some disc programs suffer the same loading problems as in the BBC B+.

Memory usage has changed too. The soft key and user defined character buffers, stored in memory pages &B and &C in the model B, now live in sideways RAM so programs reading or writing to them will only find the Econet workspace. Machine code programs tend to be the culprits here so if it's in Basic it should run, but check for the characters '?' and '!'.

DFS workspace has been similarly relocated, to leave the bottom of user memory set at &E00. Some programs look at the disc catalogue area to find out whether a certain file is on disc. These will not work. Tape programs which load below &1200 and which do nothing illegal should run without the manoeuvring of the code needed on the model B.

Many older games will not run on the

B+ or the Master. From the outset, the User Guide for the old BBC B made it clear there were legal and illegal methods of screen access but fast action games usually write directly to the screen memory to get it. Among those programs that will not run as a consequence are *Castle Quest*, *Aviator*, *Ghouls*, *Hunchback* and *Southern Belle*.

However, legal accesses to operating system routines, using *FX calls to replace illegal pokes, do work, which is why Acorn insisted programmers should use them. The outlook is not all gloomy, as many games, such as *Elite*, have been rewritten to take advantage of the Master's extra memory and graphics facilities. Even the old BBC B+ has had *Repton 2* rewritten for it.

Other games may be persuaded to run in the BBC B+. Some check which machine they are in by testing the value returned by INKEY-256, usually in the initial Basic program of a suite. Its job is typically to display the title and reset PAGE. Try loading it, then GOTO the line after the one which mentions INKEY-256.

Games are not the only victims, though. They include early utilities such as *Disc Doctor*, designed for use with the 8271. The best bet is to buy a more up-to-date program; *Disc Doctor* has been superseded by the *ADI* and other toolkits which work with either controller chip.

The *View* family all work, apart from that problem with *View* A2.1 and shadow RAM. *Wordwise* + 1.4e runs in both the B+ and *Master*.

## Some solutions

It would take a book to list every potential conflict even if the line were drawn at a high level of incompatibility, so it is better to assume that you can't count on equipment and/or software working perfectly together until proved otherwise.

Reliable information is essential but, from readers' letters to *Acorn User*, it is clear dealers can't always be relied on to give correct advice. The computer press and suppliers are better bets. So read the packaging carefully. The words 'OS 1.2 only' warn of potential incompatibility with the Master. If, having plugged in and booted up, complications arise, try unplugging extra hardware and temporarily superfluous ROMs, one at a time, starting with the higher priority sockets, to find the cause of the trouble.

Sometimes, there is no solution: a poorly buffered external ROM socket can overload the micro, particularly if extra hardware such as a DDFS board is already fitted, but there is no way of telling without a pre-purchase trial. This is where the accumulated experience of computer club members is invaluable.

Alternatively, the difficulty may be software bugs or equipment failure. It is easy to crack a circuit board track when fitting hardware and then blame the board for the subsequent failure. So be careful! If you suspect a broken track or soldered joint, remove the new equipment and switch on. If it works, return the hardware. If not, take the micro to a repair shop. Those experienced with soldering irons could try tapping the new board while plugged in and running. If something happens, the problem may be solved by judicious use of the iron.

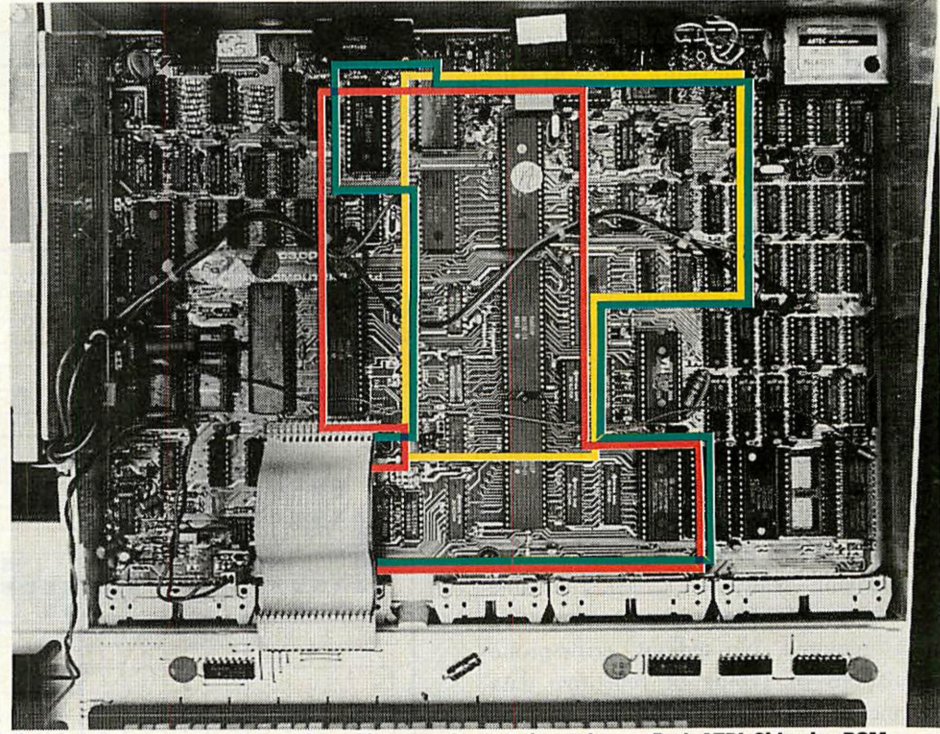
Some software houses debug programs by the simple expedient of letting customers find the mistakes. While they may replace, for example, a bug-riddled DFS quickly and for nothing, it means frustration and many wasted hours for the guinea pig. It is a wise buyer who keeps in mind that a bargain is often paid for in ways other than money.

On a brighter note, an apparent incompatibility may in fact need nothing more than a star command to rectify it. A program that previously displayed no problems may come up with a blank screen but, if shadow RAM is present, all that may be needed is to switch it out. Other problems with ROMs may be solved by 'turning off' a socket. This can be done with *UNPLUG on the Master.

Finally, even if pieces and of hardware or software refuse to cohabit with one another, it may not be too late to salvage the situation. Consumer law gives buyers the right of refund in the event of something being unsuitable for the purpose for which it was sold. If equipment refuses to operate properly, you are on a stronger footing to ask for your money back if, before buying, you told the supplier about any extras living in your micro. But it is better not to let it get that far.

So before parting with cash, do investigate thoroughly. If you've got a B+ or Master, beware of early versions written just for the BBC micro when buying second-hand. Perhaps the single most useful thing to do is to join your local computer club or user group. Details are available from local libraries and the computer press. The second is to read magazine reviews and, if any queries come to mind, call the manufacturers and ask them about it. They are likely to have encountered your query before and, if not, are in the best position to find out.

If it all sounds like doom and gloom, remember there are hundreds of thousands of satisfied Acorn users who have never had a worry. The flexibility of the BBC micro is still its greatest asset.



**Three of the most popular boards and how much room they take up. Red: ATPL Sidewise ROM board, green : Watford's ROM board and yellow: Aries B32 shadow RAM**

# INSPIRED INSCRIPTIONS

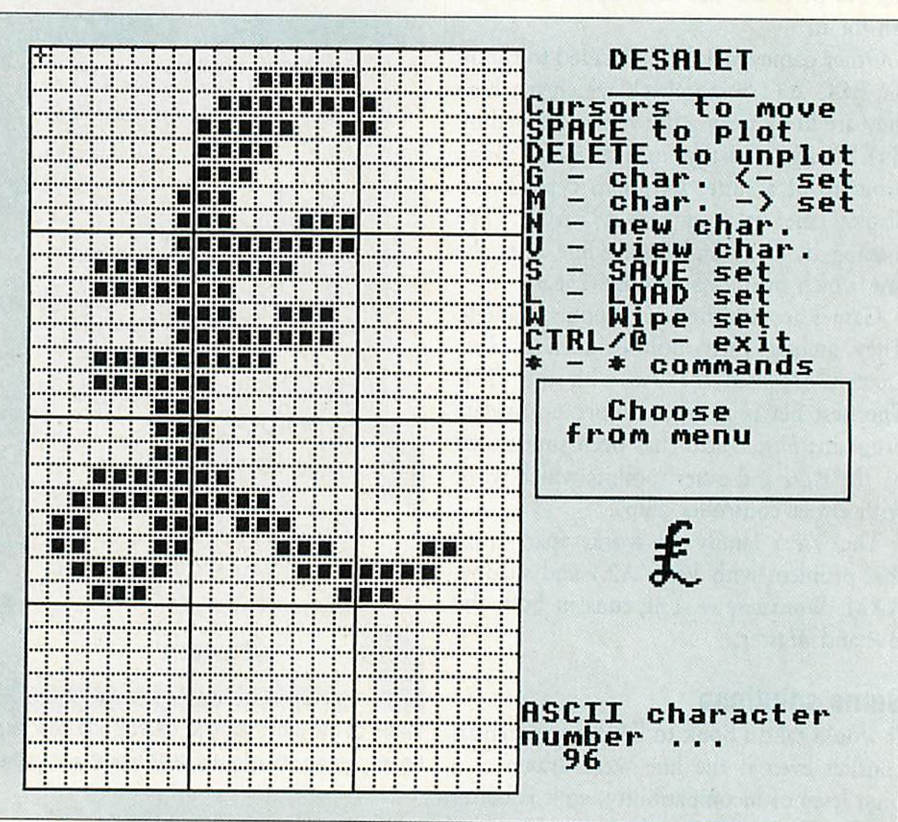
**Design your own typefaces for posters and letterheads with the *Desalet* program**

**George Yetts**

On first seeing the *Calligraphy* program in *Acorn User* (September, 1986) I was impressed by the quality of the printout and could see an immediate use for it. But even though the concept and execution of the printout program were admirable, I could not come to terms with the paper and pencil designing which then required calculation and typing in the listing before a character could be seen in all its glory. This article is the result of my aversion to paperwork.

The *Desalet* program (listing 1 on the yellow pages) is a simple sprite creator to produce customised letters for use in a modified version of the *Calligraphy* program. Having created, on-screen, a suitable font set, it is saved to disc and can be called up as required. No tedious, error-prone calculations or typing of repetitive data statements. Previously saved sets may be modified or added to as necessary and cover a full 94 characters per set. The *Desalet* program provides full on-screen prompts and some data protection in its error handling.

The second program, *Modical* (listing 2 on the yellow pages) is a modification of the original *Calligraphy* program to allow use of disc based font sets created by *Desalet* rather than the original program data statements. *Modical* also incorporates a file creation program, based on the original but modified to permit files to be printed immediately or saved for later printing. This section also shows the characters available in the currently selected font on screen. Original *Calligraphy* program lines are left in multiples of 10 with altered or added lines having increments of one to assist conversion for those who typed in the original *Calligraphy* listing.




A pound sign designed using the *Desalet* program

A further small program, *Convdat* (listing 3) is included which allows anyone who typed in the original *Calligraphy* program to convert its data statements to *Desalet* format without having to re-enter the data. The original data statements, for an upper case set, are included.

The monthly disc/tape gives a data file which includes the above together with the characters shown on the BBC micro's keyboard. A second file gives some foreign characters and mathematical symbols.

As an added bonus, it should be noted that a small logo can be created using a single character, or several characters may be linked together to produce a larger one.

## The *Desalet* program

After dealing with the reply to a prompt asking whether to clear the data store in memory, the program draws a 24 by 32 element grid, to represent the characters used in the *Calligraphy* program, and defines it as a graphics window.

This grid contains a movable cursor and has distinctive lines separating each block of eight squares. These blocks represent the size of a normal character. Initially all squares are blank but the square containing the cursor can be filled (PROCfill) or a filled square cleared (PROCdel).

The menu options are now printed and a prompt asks whether you want to load an

existing file or define a new one. Then the main REPEAT UNTIL program loop (lines 410 to 570) takes over until you want to quit the program or an error occurs. In both cases the program shuts down in a controlled manner returning to Basic, and in the case of an error, saves existing data to a disc file.

The various procedures, all fairly simple in themselves, break the program into manageable segments making it possible to follow the course of any operation.

The heart of the program is PROCpoints(op%) which uses a series of FOR NEXT loops to scan each individual square on the grid and, depending on the value of the parameter passed in (op%), either extracts or plots data relevant to that particular position. If extracting data, it uses Basic's POINT command to determine whether the square is blank (zero) or filled (one).

The grid is treated as three rows, 32 dots deep by eight dots wide. Each vertical column of eight dots is looked at in turn, the dots being represented by the bits in a single data byte. The whole grid takes up 96 bytes of data, and these are stored in memory starting at location &B00.

When plotting data, a similar process decodes the data at &B00 and fills a square if its corresponding bit value is one. In this case the data is first retrieved from the memory file (&3000 to &57FF) and stripped, by PROCgtch, of the extra bytes required only by *Modical,* before being stored at &B00.

PROCvw operates in a similar way but stores, from &C70 onward, bytes representing rows across each block. This produces data for 12 user-defined characters which are then printed out together to display the complete large character on the screen. The original skeleton program used 'DIMed' arrays for storage of grid data but as 10,000 plus bytes of available memory are used for file storage and a further 6000 plus bytes by the program, leaving us rather short of bytes, another method has to be adopted.

The data is stored sequentially in memory blocks &C00 and &B00, to leave the user memory free for the Basic program. The choice of using memory for data files, as opposed to disc storage, was mainly for speed of access to characters. But it has the added bonus of making the program compatible with cassette-based systems. It does, however, prevent it working over a network on Masters. If you want to use a Master this way you could DIM two arrays called B00 and C00 to replace these storage areas. For users of systems which do not allow disc or network operation at the &1200 location it is possible to convert to a completely disc-based method of file storage, freeing memory from &3000 to &5800 and permitting the program to run at a normal page setting.

The original program cleared the grid in about one second but was a little messy. Now individual points are unplotted, which takes some 18 seconds. After entering program listing 1, save it before trying to run it. Until all errors introduced in entry are eradicated, it is best to change line 150 to the following:

150 ON ERROR REPORT:*FX4:END

as it is pointless and time consuming to have PROCerr save non-existent data. The most likely operating errors are pressing Escape or trying to load a file which does not exist on the drive in use and PROCerr caters for these but will not work with cassette storage. Should the program be exited, or aborted, without first saving the memory file it is still possible to recover the data by entering: *SAVE file 3000 5800. Then press the Return key to save it.

**Sample character sets**

*Modical* (listing 1) has one change from the original *Calligraphy* listing. To control the formatting of text, the red function keys are used. Lines 5020 to 5050 define keys 0 to 2 to give left, right-justified or centred text. Key 3 makes the spaces between words more even. To centre text on a line, press f2, then type in the text.

If your printer does not have automatic line feed, the text is all printed on one line. This can be cured by altering line 290 to:

290 VDU 1,13,1,10

Character numbers from 32 to 126 may be defined. Command entries may be either upper or lower case. A beep is given to signify the start of an operation together with a displayed indication. Distinctive sounds, together with a message, signify completion of an operation, an illegal entry, or alert to a possibly destructive action. Leaving the program with CTRL-@ does not destroy the file in memory which can be recovered either by *SAVE file 3000 5800 or by re-running the whole *Desalet* program and replying with a 'No' to the initial prompt.

If an error occurs the program will, if permitted, save existing data to disc. It is therefore imperative that room is available on the disc currently in use. The disc full error will set up an endless loop!

Having produced a satisfactory set, it may then be used for print-out by chaining *Modical* and following the prompts.

To use *Convdat* which converts the original 'in-program' data statements into *Desalet* format, enter:

PAGE=&1200
CHAIN "Convdat"

If you already have the original *Calligraphy* program then you need not re-enter the data lines, just type in the rest of *Convdat* and save it as a spool file. Now load the original *Calligraphy* program and delete all but the data statements ie:

DELETE 0,1550:
*EXEC Convdat
LIST, and finally RUN

This creates a font file on disc of the original upper case characters which may then be modified or added to using *Desalet.* Note that this is not a *Desalet* file but should be loaded, either before starting, then replying 'No' to the initial memory clear option, or during the program by using the star command option on the *Desalet* menu. It can then be saved as a *Desalet* file in the normal way.

For the logo, the data lines of *Convdat* should be replaced by listing 4, the *Logo*

data, and program lines numbered 440 and 560 should be character changed to:

```
440 FOR L%=0 TO 3
560:
```

ie, line 560 is not now required.

These changes are necessary since the upper case set does not use the lower three of the 12 eight by eight blocks and the original listing gave no values for them. *Desalet* always uses all four blocks, so line 560 manufactured this non-existent data.

For the logo or for lower case letters all four blocks are properly defined.

Printing a logo is quite simply accomplished by printing two or more suitably defined characters so that they join. The listing *Logo* gives data for four characters, which I've defined as A,B,C and D. These were produced on-screen using *Desalet* but given here in the form of data statements for conversion using *Convdat.*

When running *Convdat,* save the font file using the filename Logo, and to print out the design use *Modical* with this font file to print two lines:

CE AB

Press f2, then A, then B, then Return.

CE CD

Press f2, then C, then D, then Return.

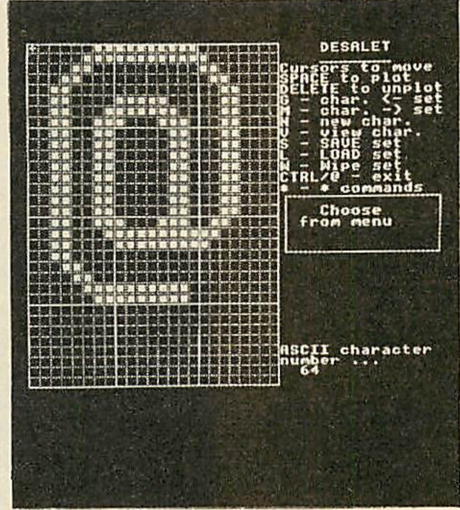
This is centred, but provided they match up vertically, and are on two successive lines, any position along the line will do. When putting *Desalet* characters, which are to become part of a logo, into memory be sure that vertically matching characters are allocated the same number of columns.

## Resident integers

C% ASCII character number
E% Flag showing error has occurred and used by PROCchartomem to specify 24 column save
N% Number of columns of dots for *Modical* program
Q% Flag to show whether a load or memory clear is in reply to start-up prompt
R% Flag set by PROCquery telling PROCload to abort
S% Flag used by PROCquery to choose which message to print
V% Flag specifying message for PROCnquery
X% Graphics screen co-ordinate
Y% Graphics screen co-ordinate

## Strings

**com$** OSCLI command
**f$** Filename
**ms$** Messages for PROCms
**osc$** Specific string for PROCoscli




@ character from Desalet set 1

## USING DESALET

1 Set PAGE to &1200 and then CHAIN "DESALET"
2 Enter Y to first prompt if defining a new character set
3 Enter L in response to next prompt to load a font set or N to create a new set
4 Enter Set 1 (or any other available) at next prompt for filename if you entered L in 3 above.
5 Enter N to define a new character or G to get a character from memory
6 Enter your chosen character in response to the next prompt
7 To modify the character, move the cursor using the cursor keys, and plot or unplot pixels as instructed by the displayed menu using Space and Delete keys
8 To view the modified character at actual size enter V
9 To incorporate the created character into the set in memory enter M as shown in the menu and enter the number of columns to be used for print-out
10 To save a completed/part completed set to disc enter S and give it a filename when prompted
11 A star command is available but is really only of use in changing drives or loading a *Convdat* file (see below) since the screen area available for reading say a *CAT command is so limited.

## Integers

**ch%** VDU23 character number in PROCvw
**chstp%** Increment to ch%
**clrmem%** Confirms PROCclrmem to proceed
**col%** Grid column number
**d%** Memory address
**dat%** Number specifying position of byte
**datno%** Position of byte in string
**dspt%** Increment to data byte number
**g%** GET variable
**hbk%** Horizontal VDU character size block
**hgr%** Horizontal grid position
**hof%** Offset to hrg%, value depends whether plotting or extracting data
**loop%** Loop counter for plotting
**loop1%** Character in PROCvw
**mem%** Loop variable for memory clear
**ms%** Tells PROCclrmem to activate PROCalert if not in reply to start-up prompt
**n%** Increment to data number
**num%** Message number for PROCmess
**op%** Tells PROCpoints whether to plot or extract data
**osc%** Address of string used in PROCoscli
**row%** Grid row number
**vbk%** Vertical VDU character sized block
**vgr%** Vertical grid position
**vof%** Offset to vgr% (see hof%)
**xpos%** Co-ordinates for . . .
**ypos%** . . . message printing

## Procedures

**alert** Alerts user to a potentially destructive operation
**chmem** Puts data shown on grid into memory as 96 dot bytes and four column bytes ready for use in *Modical*
**clm** Clears data memory area
**cur** Plots cursor
**del** Deletes grid point
**down** Cursor down
**err** Handles errors - not Breaks
**fill** Plots grid point
**fin** Signals an operation complete
**gr** Draws grid
**gtch** Gets specified character from memory to display
**input** Enters character required
**left** Cursor left
**load** Load named data file
**ms** Print appropriate screen message
**nquery** Seeks confirmation for PROCnwch/PROCgtch to clear existing character data
**nwch** Clear grid and do PROCinput
**oscli** Simulates Basic II's OSCLI command
**plotdata** Gets data from memory and plots on grid
**points** Used by PROCs chmem and gtch
**query** Queries potentially destructive operation
**right** Cursor right
**save** Save named data file
**up** Cursor up
**vw** Display actual size character on screen

*Turn to the yellow page index on page 113 for details of the Desalet listings.*

# COMPETITION

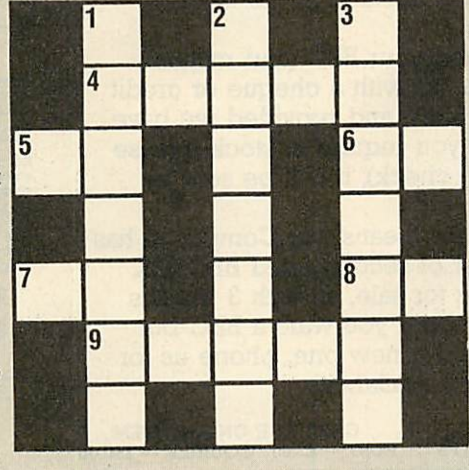
## CROSS PURPOSES

**Fifteen *Acorn User* software packs worth over £550 in total are up for grabs in this simple crossword quiz**

***Tony Quinn***

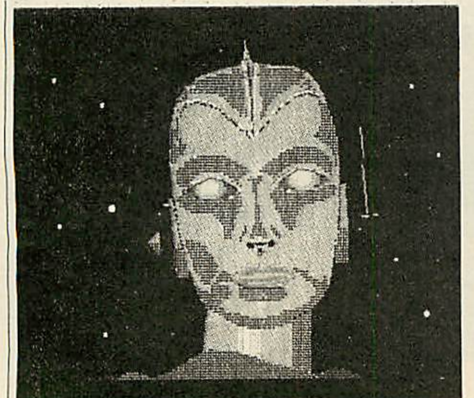
### Across
4 Arty teachers' group (5)
5 Modern times for Christians (2)
6 Note for the Sound of Music (2)
7 It's in the bones (2)
8 'Rubber Duck' might do a 10.4 about 'the smokies' on it (2)
9 The price for brilliant music (2,3)

### Down
1 Horrible mug! (3,4)
2 Place where Lady Penelope might stop for a cuppa (3,4)
3 Covered in graffiti (7)




### Computer buff clues
Across
4 707294
5 371 (twice!)
6 Mixed-up 205
7 202
8 LDY 202: INY
9 205, 4078

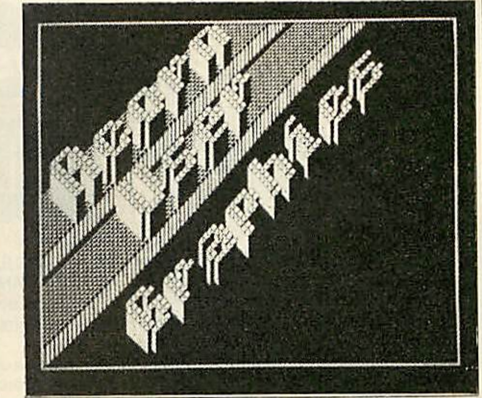
Down
1 2989, 64206
2 4011, 51966
3 263114461 (anag)



A screen from the *User Dump* ROM




The *Sideways RAM Utilities Disc* RAM Pad



Manipulate screens with *Graphics Utilities*

This month's competition is a doddle (it must be, the Editor set it). What you have to do is fill in the crossword and then do a count of the number of times each letter is used for the answers.

Simply do a table on the back of your postcard like this:

A:3
B:8
C:6

and so on.

There are two sets of clues above depending on whether you consider yourself a computer whizz or not.

The mega prize this month is a set of *Acorn User*'s own software. Each of the first 15 correct entries drawn out of the hat will win a pack consisting of the following:

- *UserDump ROM* which will print graphics screens on Epson-compatible printers – worth £19.95.
- *Sideways RAM Utilities Disc* with a 'Notepad' to use while you're in the middle of a program, routines to help you write your own ROMs and on-screen fonts – worth £9.95
- *Graphics Utilities Disc* with 16 machine code utilities for manipulating pictures, a teletext editor and a Basic procedure library – worth £7.95.

Details of all these products can be found in the offers section of the magazine on pages 131 to 135 inclusive.

Send your answers in on the back of a postcard please to: May Competition, *Acorn User*, 141-143 Drury Lane, London WC2B 5TF.

Entries must arrive by May 19, 1987. Don't forget your own name and address – and attach the small coupon at the bottom of the page to the postcard.

Answers and winners will be published in the July issue.

The Editor's decision is final.

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CD200 ....................... £188.60
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EPSON LX80 ................. £217.35
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1451 ....................... £251.85
1431AO ....................... £251.85
1451AP ....................... £286.35
KAGA/TAXAN 12" ........ £113.85
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- Excellent error diagnostics
- Linker
- Editor and symbolic disassembler provided

### A comparison of three 65C12 assemblers

| Feature | ADE + | BBC Basic | MACROM |
|---|---|---|---|
| Number of pseudo-ops | 64 | 4 | 36 |
| Use of all available RAM | Yes | No | No |
| Macros | Yes | No | Yes |
| Relocatable output | Yes | No | No |
| Linker with libraries | Yes | No | No |
| High level constructs | Yes | Yes | No |
| Number of error reports | 39+warnings | 3+BASIC errs | 20 |
| 65C00 extended opcodes | All | 65C 12 only | 65C12only |
| Switch off 65C 12 opcodes | Yes | No | No |
| ROM size | 32K | 16K | 16K |
| Disassembler | Yes | No | Yes |
| Label restrictions | No | Yes | Yes |




### Versions and prices

***Recommended for Master Compact...***
ADE+ MMU and 65C00 series assembler on disc (3.5" ADFS). 32K sideways RAM required.
**£42.00 + vat**

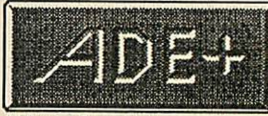
***Recommended for BBC B, B+ ...***
ADE+ MMU and 65C00 series assembler on 2 16K EPROMS with DFS 5.25" utilities disc.
**£46.00 + vat**

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ADE+ MMU and 65C00 series assembler on EPROM cartridge with 5.25" DFS utility disc.
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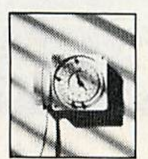
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# INTER-WORD

ROM
INTER-WORD
The integrated word processor for the BBC Microcomputer
Computer Concepts

## The integrated word processor for the BBC micro

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**• Multiple documents in memory**
Most people do not work on one document at a time. INTER-WORD allows up to 16 documents to be stored in memory at once, and text to be transferred from one to another.

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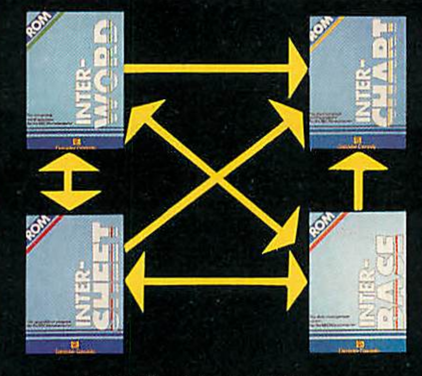
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Available to all WORDWISE PLUS owners. Simply quote your serial number, name and address when ordering direct. Discount price; **£39.20 + VAT (£45.08 incl.)**

*Review*

**"INTER-WORD is the most powerful and comprehensive word processor available for the BBC today. It is more powerful and flexible than View and still retains much of the friendliness and ease of use of Wordwise. Inter-Word looks set to become the standard word processor for the BBC Micro."**

*Beebug, Aug/Sept '86*




**Inter-Word is part of the 'ROM Link' series which is the only truly integrated suite of ROMs for the BBC micro.**

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Computer Concepts

**Gaddesden Place, Hemel Hempstead, Herts HP2 6EX, England. Telephone (0442) 63933**

**• Block operations**
These are common to most word processors, but with INTER-WORD any part of the text can be marked and then instantly moved, copied, deleted, printed, saved, underlined etc. There is no limit to the amount that can be marked.

**• Automatic re-formatting**
This enables the user to just type—no keys to press to re-format the paragraph after changes to the text or margins have been made; the margins on the rulers can simply be dragged, all text being instantly re-formatted to the new settings.

- **40, 53, 80 and 106 column screen modes**
- **Mail merge**
- **Integrates with all other parts of INTER family**
- **Automatic page numbering, with headers and footers**
- **Very fast and smooth scrolling**
- **Powerful search and replace facilities including wildcards, upper/lower case sensitivity, stored search and replace strings for instant re-use**
- **Automatic word count**
- **Fast simple cursor movement to any point**
- **Easily tailored to any printer**
- **Line numbering**
- **Selectable screen colours**
- **Compatible with the B, B+ and Master; Solidisk, Aries and Watford shadow RAM boards.**

MONEY-BACK
**GUARANTEE**

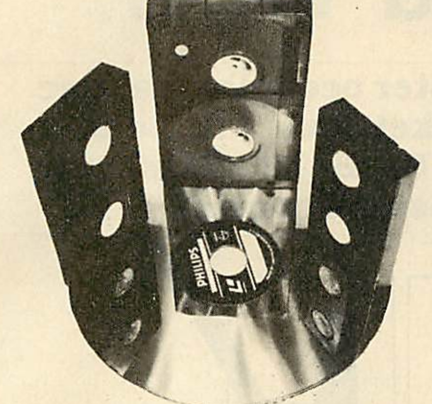
**Buy INTER-WORD—if you don't like it—send it back for a full refund!**
(Available when purchased directly from Computer Concepts)




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Compatible with all BBC Micros




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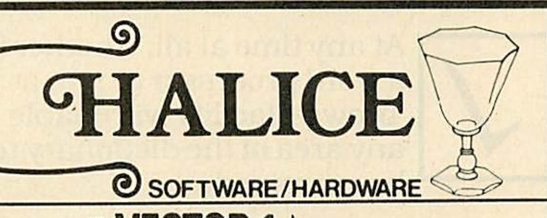
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## ■ VECTOR 1 ▸

TAPE TO DISK UTILITY

**FEATURES**

+ Once only purchase
+ Can save to any disk
+ Very user friendly, help pages on disk
+ 40/80 Format
+ No awkward ROMs, can be used on any machine
+ Can load to all available RAM &400-&7FFF
= Simply the best tape to disk utility available

Vector 1 versions compatible with Acorn, Opus, UDM, Cumana, BBC + & Watford (Not 1-42, 1-43 DFS's.)

## ■ VECTOR 2 ▸

DISK TO DISK UTILITY

**FEATURES**

+ 40/80 Format
+ User friendly, menu driven
+ Contains powerful features such as a disk sector editor, Disk Compare, format, verify and track repair
= The most powerful disk utility available

**VECTOR 1 & VECTOR 2 now compatible with BBC + and Master series and Opus 1770**

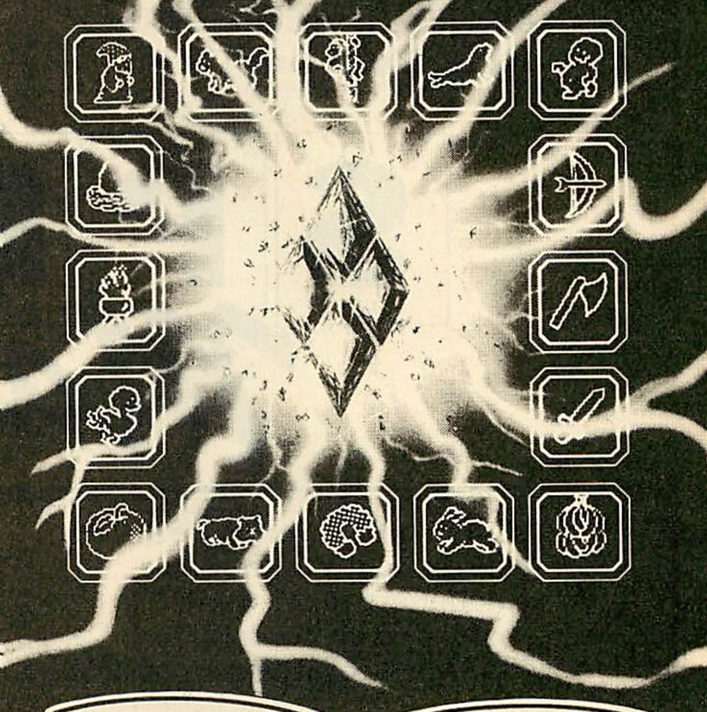
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**Prices:** £12.00 each for Vector 1 or Vector 2 £23 for both.

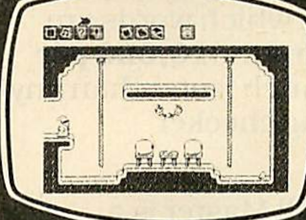
**PLEASE SPECIFY DFS**

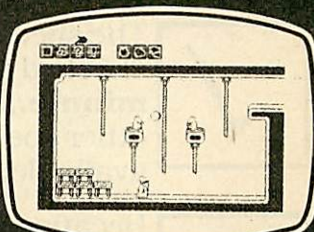
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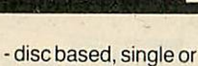



FONTWISE PLUS is now compatible with VIEW, MINI OFFICE II, EDWORD 2 and INTERWORD as well as WORDWISE and WORDWISE+!

Now you can have PROPORTIONAL and JUSTIFIED text in 12 different fonts, all within the same document if required. In addition to the standard facilities like line and page length, pagination, left margin etc. we have now added

- Enlarged, standard & condensed fonts
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- User definable character spacing
- Non proportional fonts
- Now with 12 fonts
- Plus many more features

If you are not convinced ask us to send you a sample printout and you will be amazed at the quality - requires an EPSON compatible printer capable of single, double and quad density graphics but you do not require any RAM in your printer to use FONTWISE PLUS.

##  BETA-BASE £25



40 80 3" 0

**SPECIFICATION**

| | |
|---|---|
| 1) Random Access | - disc based, single or dual drives |
| 2) File Size | - max 65,000 records |
| 3) Record Size | - up to 2048 characters and 200 fields |
| 4) Field Size | - up to 254 characters |
| 5) Holds | - approx 1200 ADDRESS records per 100k |
| 6) Search | - 5 search fields using powerful options |
| 7) Sort | - 500 records on 3 fields in 60 seconds. |

**SYSTEM FEATURES**

*CALCULATE - using any valid expression
*PRINTOUT - Powerful options
*REDEFINE - Titles, fields etc.
*TRANSFER - From one file to another
*GLOBAL ENTRY - of repetitive data
*SEARCH LISTS - Allow creation of sub Databases within main Database
*SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
*INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure

## BETA-BASE UTILITIES £12.00

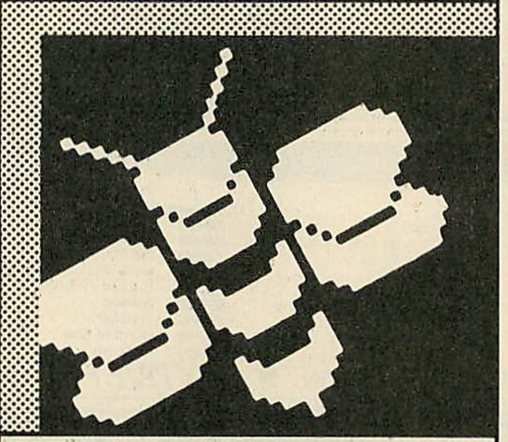



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*MAIL MERGE
*LABEL PRINTER
*DISC SORT
*EXTENDED SEARCH
*FREE FORMAT TRANSFER
*FAST PACK
*STATUS

The MAIL MERGE alone is worth £12 so you get a real bargain with this disc. The features are so numerous that we cannot mention them all here.

Ask for our UTILITIES DATA SHEET if you want more information.



## RAMROD £40 ROM £35 DISC




RAMROD is the ultimate in toolkit ROMs and is fully compatible with the whole BBC range from Model B through to the MASTER 128 and including both 6502 and TURBO co-processors. RAMROD adds 54 new commands to your computer. Areas covered are DISC (DFS & ADFS), GENERAL (memory commands etc.), ROM (including sideways RAM) and TUBE.

RAMROD provides commands to dump memory or a disassembly of memory to a printer. Editors can display the screen in 40 or 80 column mode.

**DISC**
Edit discs and search for ASCII or HEX sequences.

**GENERAL**
Edit, search, disassemble, compare, dump to printer and relocate ANY area of memory including the SHADOW screen. List vectors in use, load and save function keys even on MASTER etc.

In addition to the above you can move between ROM/RAM banks using (CTRL) Cursor Keys when in either memory or disassembly mode PLUS you can switch between memory editor and disassembler by pressing (CTRL)(TAB).

**ROM**
Includes commands for listing, loading, saving, wiping, swapping, ROM images. PLUS formatting and titling RAM banks for the ROM filing system and saving programs in RFS format.

**TUBE**
Provides the same memory commands as GENERAL plus SHIFT and COMPARE memory across the TUBE both ways.

We cannot do justice to RAMROD in the space here so please ask us to send you a fuller data sheet - RING NOW!

**NEW PRODUCTS**
Watch out for a fabulous new product which will be released during SEPTEMBER for the MASTER and its compatibles.

This is a high quality art package called ARTROOM but it offers many features not provided elsewhere. It is a full screen package and is written by the authors of FLEET STREET EDITOR so you know that it will be good.

Ask for a data sheet NOW!

## MACROM £40 £35 DISC




MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
- Tokenized source code
- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.
**Ask for a data sheet today**

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40 ———— 40 TRACK
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# YELLOW PAGES

## INDEX/COMPATIBILITY

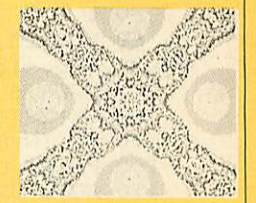
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To make the task of entering listings easier, *Acorn User* has adopted several standards in the Yellow Pages. Programs are listed with line numbers in increments of 10, so type AUTO <Return> for automatic line numbering before you start. Before you list what you've entered, type LISTO 1 <Return> to provide spaces after the line numbers. Programs in the Yellow Pages are often listed to a width of 40 characters, so type MODE 6 <Return> before you start. Comparing the line-endings of your listing with the Yellow Pages will help you spot extra or missing characters.

To make sure that the program you want to enter will work on your particular machine, check the index below. All the listings work with Basic 1,2 and 4 (unless stated otherwise) and with operating system OS1.2 or above. If a program is accompanied by an article, please read the article first. If special care is needed when entering, we provide a 'How to Enter' box.

Once you've typed in your program, save it to tape or disc then test it by running it. If you have a major problem with a listing, ask someone to check it. You can also send off for a list of *Checksums* which help you find the errors. Send a large sae (26p stamp) to *AU* Checksums, PO Box 641, London NW9 8TF.

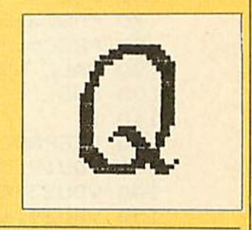




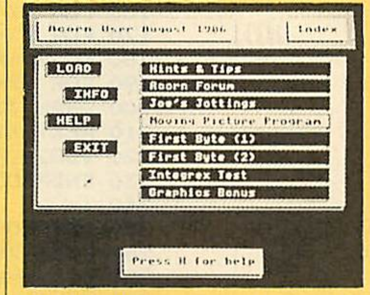








### DISCS AND TAPES




All the listings on these pages can be found on this month's listings disc or cassette. See page 109 for details.



### BACK ISSUES







For help with entering and debugging listings see the following back issues: April '86, June '85, Aug '84, Sept '83.

| Program | Page | BBC B | B+/128 | Master 128 | Master Compact | Electron | 6502SP/ Turbo | ADFS | Econet | Shadow RAM | On Monthly Tape and Disc |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hints & Tips** | | | | | | | | | | | |
| Listing 1-4 | 114 | ● | ● | ● | ● | ●1 | ● | ● | ● | ● | ● |
| **Mandelbrot Extra** | | | | | | | | | | | |
| Listing 1 | 115 | ●2 | ●2 | ● | ● | | ●2 | ● | ● | ● | ● |
| Listing 2 | 116 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
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| Listings 1-3 | 113 | ● | ● | ● | ● | ● | ● | ●3 | ● | ● | ● |
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| Listings 1-4 | 120 | ● | ● | ● | ● | | ● | ●3 | ● | ● | ●4 |
| **Network Page** | | | | | | | | | | | |
| Listing 1-2 | 127 | ● | ● | ● | ● | | ● | ● | ● | ● | ● |
| **First Byte** | | | | | | | | | | | |
| Listings 1-5 | 49 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
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| Listing 3 | 55 | | | ● | ●5 | | | ● | ● | ● | |

Notes
1 Requires Plus 1
2 Requires GXR ROM with BBC B and B+
3 Works with ADFS only if shadow RAM used
4 Extra character set files on listings cassette and disc
5 Econet clock required with Compact

See Hints & Tips, page 43

### Listing 1. Extra space-bar functions

```
   10 REM Hints & Tips Listing 1
   20 REM By Martin Phillips
   30 REM For BBC B/B+/M/C/E
   40 REM (c) Acorn User May 1987
   50 :
   60 VDU 23,254,24,60,126,-1,-1,126,60,
24,23,255,-1;-1;-1;-1;
   70 MODE 6
   80 G%=GET
   90 IF INKEY-1 AND G%=32 THEN G%=255
  100 PRINT CHR$ G%;
  110 GOTO 80
```

### Listing 2. Modes 1, 2, 4 and 5 MC screen dump

```
   10 REM Hints and Tips Listing 2
   20 REM Modes 1,2,4 & 5 MC screen dump
   30 REM by Martin Phillips
   40 REM For BBC B/B+/M/C/E
   50 REM (c) Acorn User May 1987
   60 :
   70 PROCassemble:MODE 1
   80 PROCcircles
   90 CALL &900
  100 END
  110 :
  120 DEFPROCcircles
  130 VDU19,0,4,0,0,0
  140 VDU23;8202;0;0;0;
  150 VDU29,640;512;
  160 FOR N%=100 TO 500 STEP 80
  170 FOR T%=-1 TO 1 STEP 2
  180 MOVE -N%,0
  190 FOR X%=-N% TO N% STEP 8
  200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
  210 NEXT X%,T%,N%
  220 VDU29,0;0;
  230 ENDPROC
  240 :
  250 DEFPROCassemble
  260 xlo=&70:xhi=&71:ylo=&72:yhi=&73
  270 pixel=&74:byte=&75:bitcount=&76
  280 oswrch=&FFEE:osword=&FFF1
  290 REM Change to 0 TO 2 STEP 2 once d
ebugged
  300 FOR pass=0 TO 3 STEP 3
  310 P%=&900
  320 [OPT pass
  330 LDA #2:JSR oswrch
  340 LDA #255:STA ylo:LDA #3:STA yhi
  350 LDA #27:JSR printer:LDA #65:JSR pr
inter
  360 LDA #8:JSR printer
  370 .newline:LDA #0:STA xlo:STA xhi
  380 LDA #27:JSR printer:LDA #75:JSR pr
inter
  390 LDA #64:JSR printer:LDA #1:JSR pri
nter
  400 .newcolumn:LDA #8:STA bitcount
  410 .readpixel:LDX #xlo:LDY #0:LDA #9:
JSR osword
  420 CLC:LDA pixel:BEQ setbyte:SEC
  430 .setbyte:ROL byte
  440 LDA ylo:SEC:SBC #4:STA ylo
  450 BCS columnend:DEC yhi
  460 .columnend:DEC bitcount:LDA bitcou
nt:BNE readpixel
  470 LDA byte:JSR printer
  480 CLC:LDA #4:ADC xlo:STA xlo:BCC lin
eend:INC xhi
  490 .lineend:LDA xhi:CMP #5:BEQendline
```

Continued ▶

◀ Hints & Tips listing 2 continued

```
  500 LDA #32:CLC:ADC ylo:STA ylo:BCCnew
column:INC yhi:BCSnewcolumn
  510 .endline:LDA #10:JSR printer
  520 .checkend:LDA yhi:BMI end:JMP newl
ine
  530 .end:LDA #27:JSR printer:LDA #64:J
SR printer
  540 LDA #3:JSR oswrch:RTS
  550 .printer:PHA:LDA #1:JSR oswrch:PLA
:JSR oswrch:RTS
  560 ]
  570 NEXT pass
  580 ENDPROC
```

### Listing 3. Mode 0 screen dump

```
   10 REM Hints and Tips Listing 3
   20 REM Mode 0 screen dump
   30 REM by Martin Phillips
   40 REM For BBC B/B+/M/C/E
   50 REM (c) Acorn User May 1987
   60 :
   70 PROCassemble:MODE 0
   80 PROCcircles
   90 CALL &900
  100 END
  110 :
  120 DEFPROCcircles
  130 VDU19,0,4,0,0,0
  140 VDU23;8202;0;0;0;
  150 VDU29,640;512;
  160 FOR N%=100 TO 500 STEP 80
  170 FOR T%=-1 TO 1 STEP 2
  180 MOVE -N%,0
  190 FOR X%=-N% TO N% STEP 8
  200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
  210 NEXT X%,T%,N%
  220 VDU29,0;0;
  230 ENDPROC
  240 :
  250 DEFPROCassemble
  260 xlo=&70:xhi=&71:ylo=&72:yhi=&73
  270 pixel=&74:byte=&75:bitcount=&76
  280 oswrch=&FFEE:osword=&FFF1
  290 REM Change to 0 TO 2 STEP 2 once d
ebugged
  300 FOR pass=0 TO 3 STEP 3
  310 P%=&900
  320 [OPT pass
  330 LDA #2:JSR oswrch
  340 LDA #255:STA ylo:LDA #3:STA yhi
  350 LDA #27:JSR printer:LDA #65:JSR pr
inter
  360 LDA #8:JSR printer
  370 .newline:LDA #0:STA xlo:STA xhi
  380 LDA #27:JSR printer:LDA #76:JSR pr
inter
  390 LDA #128:JSR printer:LDA #2:JSR pr
inter
  400 .newcolumn:LDA #8:STA bitcount
  410 .readpixel:LDX #xlo:LDY #0:LDA #9:
JSR osword
  420 CLC:LDA pixel:BEQ setbyte:SEC
  430 .setbyte:ROL byte
  440 LDA ylo:SEC:SBC #4:STA ylo
  450 BCS columnend:DEC yhi
  460 .columnend:DEC bitcount:LDA bitcou
nt:BNE readpixel
  470 LDA byte:JSR printer
  480 CLC:LDA #2:ADC xlo:STA xlo:BCC lin
eend:INC xhi
```

Continued ▶

◀ Hints & Tips listing 3 continued

```
490 .lineend:LDA xhi:CMP #5:BEQendline
500 LDA #32:CLC:ADC ylo:STA ylo:BCCnew
column:INC yhi:BCSnewcolumn
510 .endline:LDA #10:JSR printer
520 .checkend:LDA yhi:BMI end:JMP newl
ine
530 .end:LDA #27:JSR printer:LDA #64:J
SR printer
540 LDA #3:JSR oswrch:RTS
550 .printer:PHA:LDA #1:JSR oswrch:PLA
:JSR oswrch:RTS
560 ]
570 NEXT pass
580 ENDPROC
```

Listing 4. Circular screen dump

```
10 REM Hints and Tips Listing 4
20 REM Mode 0-6 screen dump
30 REM by Martin Phillips
40 REM For BBC B/B+/M/C/E
50 REM (c) Acorn User May 1987
60 :
70 PROCassemble:MODE 0
80 PROCcircles
90 CALL &900
100 END
110 :
120 DEFPROCcircles
130 VDU19,0,4,0,0,0
140 VDU23;8202;0;0;0;
150 VDU29,640;512;
160 FOR N%=100 TO 500 STEP 80
170 FOR T%=-1 TO 1 STEP 2
180 MOVE -N%,0
190 FOR X%=-N% TO N% STEP 8
200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
210 NEXT X%,T%,N%
220 VDU29,0;0;
230 ENDPROC
240 :
```

Continued ▶

◀ Hints & Tips listing 4 continued

```
250 DEFPROCassemble
260 xlo=&70:xhi=&71:ylo=&72:yhi=&73
270 pixel=&74:byte=&75:bitcount=&76
280 oswrch=&FFEE:osword=&FFF1
290 REM Change to 0 TO 2 STEP 2 once d
ebugged
300 FOR pass=0 TO 3 STEP 3
310 P%=&900
320 [OPT pass
330 LDA #2:JSR oswrch
340 LDA #0:STA xlo:STA xhi
350 LDA #27:JSR printer:LDA #65:JSR pr
inter
360 LDA #8:JSR printer
370 .newline:LDA #0:STA ylo:STA yhi
380 LDA #27:JSR printer:LDA #42:JSR pr
inter
390 LDA #5:JSR printer:LDA #0:JSR prin
ter:LDA #2:JSR printer
400 .newcolumn:LDA #8:STA bitcount
410 .readpixel:LDX #xlo:LDY #0:LDA #9:
JSR osword
420 CLC:LDA pixel:BEQ setbyte:SEC
430 .setbyte:ROL byte
440 LDA xlo:CLC:ADC #2:STA xlo
450 BCC columnend:INC xhi
460 .columnend:DEC bitcount:LDA bitcou
nt:BNE readpixel
470 LDA byte:JSR printer
480 CLC:LDA #2:ADC ylo:STA ylo:BCC lin
eend:INC yhi
490 .lineend:LDA yhi:CMP #4:BEQendline
500 LDA xlo:SEC:SBC #16:STA xlo:BCSnew
column:DEC xhi:BCCnewcolumn
510 .endline:LDA #10:JSR printer
520 .checkend:LDA xhi:CMP #5:BEQ end:J
MP newline
530 .end:LDA #27:JSR printer:LDA #64:J
SR printer
540 LDA #3:JSR oswrch:RTS
550 .printer:PHA:LDA #1:JSR oswrch:PLA
:JSR oswrch:RTS
560 ]
570 NEXT pass
580 ENDPROC
```

See Return of the Mandelbrots, page 81

Listing 1. Mandelbrots in Pascal

```
{$D-,R-,U-}
{Mandelbrot curve - 16 colours
  - needs GXR}

program mandel (input,output);

const
  smax=255;
  res=1024;
  maxm=256;
  maxcol=15;

type
  array1=array[1..smax] of integer;

var
  j,k: real;
  s,i,side,v: real;
  n,m: integer;
  colour,d,e: integer;
  x,y,ix,jx,kx: integer;
  c: array1;
```

Continued ▶

◀Mandelbrots continued

```
function steps(cx,cy:real): integer;
var
  n:integer;
  x,x2,y,y2:real;
begin
  n:=-1;x:=0.0;y:=0.0;
  repeat
    y2:=y*y; x2:=x*x;
    y:=2*x*y+cy; x:=x2-y2+cx;
    n:=n+1;
  until (n=smax) or (x2+y2>=4);
  steps:=n; {steps=1 to smax}
end;

procedure palette(logical,
  actual: integer);
begin
  vdu(19,logical,actual,0,0,0)
end;
```

Continued ▶

◀ Mandelbrots continued

```
procedure gcol(plotmode, col: integer);
begin
  vdu(18,plotmode,col)
end;

{main program}

begin
  mode(2);
  vdu(28,16,31,19,0);
  palette(1,5); palette(2,4);
  palette(3,6); palette(4,2);
  palette(5,3); palette(6,1);
  write('x,y: '); read(j,k);
  write('   s: '); read(side);
  v:=maxcol/ln(smax);
  for n:=1 to smax do
    c[n] := maxcol-trunc(ln(n)*v);

{main loop}

  m:=1;
  settime(0);
  repeat
    i:=side/m; ix:= res div m;
    for jx:=0 to m-1 do
      for kx:=0 to m-1 do
        if (kx mod 2 = 1) or
          (jx mod 2 = 1) then
          begin
            colour:=c[steps(j+i*jx,
              k+i*kx)];
            d:=colour div 2;
            e:=(d+colour mod 2)
              mod 8;
            vdu(23,12,e,d,d,e,e,d,d,e);
            gcol(16,0);
            x:=ix*jx; y:=ix*kx;
            plot(4,x,y);
            plot(&65,x+ix-1,y+ix-1);
    end;
    m:=m*2;
    write(m);
    until m=maxm;
  write(time);
end.
```

### Listing 2. Fifth root Newton Curves

```
 10 REM Fifth Roots
 20 REM by David Johnson-Davies
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User May 1987
 50 :
 60 TIME=0
 70 MODE 2:e=.001
 80 VDU 28,16,31,19,0
 90 INPUT"x,y: "j,k
100 INPUT"   s: "q
110 VDU 19,1,6;0;19,4,1;0;19,6,4;0;
120 Q%=1024:M%=1
130 REPEAT
140 i=q/M%:I%=Q%/M%
150 FOR J%=0 TO M%-1
160 FOR K%=0 TO M%-1
170 IF K% MOD 2 OR J% MOD 2 PROCpt
180 NEXT:NEXT
190 M%=M%*2:PRINT M%
200 UNTIL M%=256
```

Continued ▶

◀ Newton Curves continued

```
210 T%=TIME:PRINT T%/100 " SECS."
220 END
230 :
240 DEF PROCplus(u,v)
250 x=x+u:y=y+v:ENDPROC
260 :
270 DEF PROCtimes(u,v):LOCAL t
280 t=x*u-y*v:y=x*v+y*u:x=t:ENDPROC
290 :
300 DEF PROCdivide(u,v):LOCAL t,d
310 d=u*u+v*v:t=x*u+y*v
320 y=(y*u-x*v)/d:x=t/d:ENDPROC
330 :
340 DEF FNn(x,y)
350 N%=-1:IF x=0 AND y=0 =0
360 REPEAT u=x:v=y
370 PROCtimes(u,v):PROCtimes(u,v):PROC
times(u,v):x4=x:y4=y
380 PROCtimes(u,v):x5=x-1:y5=y
390 x=4*x+1:y=4*y
400 PROCdivide(5*x4,5*y4)
410 N%=N%+1
420 UNTIL x*x+y*y>1E7 OR x5*x5+y5*y5<e
430 IF x*x+y*y>1E7 =0 ELSE =N%
440 :
450 DEF PROCpt
460 x=j+i*J%:y=k+i*K%
470 PROCgcol(FNn(x,y) MOD 16)
480 X%=J%*I%:Y%=K%*I%
490 MOVE X%,Y%:MOVE X%+I%-1,Y%
500 PLOT 85,X%,Y%+I%-1
510 PLOT 85,X%+I%-1,Y%+I%-1
520 ENDPROC
530 :
540 REMDEF PROCgcol(B%)
550 GCOL 0,B%/2:ENDPROC
560 :
570 DEF PROCgcol(B%)
580 D%=B% DIV 2
590 E%=(D%+B% MOD 2) MOD 8
600 VDU 23,12,D%,E%,E%,D%,D%,E%,E%,D%
610 GCOL 16,0
620 ENDPROC
```

See Rollicking Robots, page 85

### Listing 1. Robot drawing program

```
 10 REM Robot screen drawing program
 20 REM by Joe Telford
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User May 1987
 50 :
 60 MODE1
 70 PROCbuildrobot
 80 PROCbuildbells
 90 PROCbuildarms
100 PROCscreen
110 END
120 :
130 DEFPROCbuildrobot
140 VDU23,128,255,127,255,127,255,127,
255,170
150 VDU23,129,255,255,255,255,240,240,
240,240
160 VDU23,130,255,255,255,255,15,15,15
,15
170 VDU23,131,255,255,240,240,240,240,
255,255
180 VDU23,132,255,255,15,15,15,15,255,
255
```

Continued ▶

# YELLOW PAGES

## JOE'S JOTTINGS

◀ Joe's listing 1 continued

```
190 VDU23,133,255,255,0,0,0,0,255,255
200 VDU23,134,54,54,195,195,195,195,54
,54
210 DATA17,1,32,32,129,128,130,32,32,1
0,8,8,8,8,8,8,8
220 DATA32,32,131,133,132,32,32,10,8,8
,8,8,8,8,8
230 DATA32,32,32,128,32,32,32,10,8,8,8
,8,8,8,8
240 DATA128,128,128,128,128,128,128,10
,8,8,8,8,8,8,8,8
250 DATA128,32,128,128,128,32,128,10,8
,8,8,8,8,8,8
260 DATA128,32,128,128,128,32,128,10,8
,8,8,8,8,8,8
270 DATA17,3,134,32,17,1,128,128,128,3
2,17,3,134,17,1,10,8,8,8,8,8,8,8
280 DATA32,32,128,128,128,32,32,10,8,8
,8,8,8,8,8
290 DATA32,32,128,32,128,32,32,10,8,8,
8,8,8,8,8
300 DATA32,32,128,32,128,32,32,10,8,8,
8,8,8,8,8
310 DATA32,128,128,32,128,128,32,0
320 RESTORE
330 robot$=""
340 REPEAT
350 READ part%
360 robot$=robot$+CHR$part%
370 UNTIL part%=0
380 ENDPROC
390 :
400 DEFPROCprintrobot(x)
410 PRINTTAB(x*8,5)robot$
420 ENDPROC
430 :
440 DEFPROCprintbell(x,b)
450 PRINTTAB(x*8+(b-1)*6,3);bell$
460 ENDPROC
470 :
480 DEFPROCbuildarms
490 RESTORE 500
500 DATA17,2,137,138,10,8,8,32,10,8,32
,10,8,32,10,8
510 DATA17,1,128,10,8,128,10,8,128,10,
8,17,3,134,0
520 armdown$=""
530 REPEAT
540 READ part%
550 armdown$=armdown$+CHR$part%
560 UNTIL part%=0
570 $&900=armdown$
580 RESTORE 590
590 DATA17,2,139,140,10,8,8,17,3,134,1
0,8,17,1,128,10,8,128,10,8,128
600 DATA10,8,32,10,8,32,10,8,32,10,8,0
610 armup$=""
620 REPEAT
630 READ part%
640 armup$=armup$+CHR$part%
650 UNTIL part%=0
660 $&930=armup$
670 ENDPROC
680 :
690 DEFPROCbuildbells
700 VDU23,135,3,15,31,63,63,63,63,63
710 VDU23,136,192,240,248,252,252,252,
252,252
720 VDU23,137,63,127,127,255,3,15,15,3
730 VDU23,138,252,254,254,255,192,240,
240,192
740 VDU23,139,63,127,127,255,0,0,0,0
750 VDU23,140,252,254,254,255,60,255,2
55,60
```

Continued ▶

◀ Joe's listing 1 continued

```
760 bell$=""
770 RESTORE 780
780 DATA 17,2,135,136,10,8,8,137,138,0
790 REPEAT
800 READ part%
810 bell$=bell$+CHR$(part%)
820 UNTIL part%=0
830 ENDPROC
840 :
850 DEFPROCscreen
860 GCOL48,2
870 PROCR(0,928,1279,96,1)
880 GCOL0,1
890 VDU5
900 MOVE128,1000
910 PROCdbh("The Rhythmical Rollicking
Robots")
920 VDU4
930 GCOL48,2
940 PROCR(0,0,1279,512,1)
950 GCOL0,1
960 VDU5
970 MOVE160,80
980 PROCdbh("Another one of Joe's Jott
ings!")
990 VDU4
1000 FOR bell%=0 TO 4
1010 PROCprintbell(bell%,1)
1020 PROCprintbell(bell%,2)
1030 NEXT
1040 FOR robot = 0 TO 4
1050 PROCprintrobot(robot)
1060 NEXTrobot
1070 COLOUR 131:COLOUR0
1080 VDU28,1,28,38,18,12,10
1090 ENVELOPE1,8,0,0,0,0,0,0,126,-4,-2,
-1,126,98
1100 ENDPROC
1110 :
1120 DEFPROCR(x,y,l,w,f)
1130 MOVEx,y
1140 DRAWx+l,y
1150 IFf=0 DRAWx+l,y+w ELSE PLOT85,x,y+
w
1160 IFf=0 DRAWx,y+w ELSE PLOT85,x+l,y+
w
1170 MOVEx,y+w
1180 IFf=0 DRAWx,y ELSE MOVEx,y
1190 ENDPROC
1200 :
1210 DEFPROCdbh(x$)
1220 LOCAL char%,c%
1230 c%=&70
1240 FOR char%=1 TO LENx$
1250 ?c%=ASC(MID$(x$,char%,1))
1260 A%=10
1270 X%=(c% MOD &100)
1280 Y%=(c% DIV &100)
1290 CALL&FFF1:REM osword
1300 VDU23,141,c%?1,c%?1,c%?2,c%?2,c%?3
,c%?3,c%?4,c%?4
1310 VDU141,10,8
1320 VDU23,141,c%?5,c%?5,c%?6,c%?6,c%?7
,c%?7,c%?8,c%?8
1330 VDU141,11
1340 NEXTchar%
1350 ENDPROC
```

Listing 2. Sound and movement procedures

```
10 REM Robot sound/move procedures
20 REM by Joe Telford
30 REM for BBC B/B+/M/C/E
```

Continued ▶

◀ Joe's listing 2 continued

```
   40 REM (c) Acorn User May 1987
   50 :
   60 PROCgetarms
   70 PROCmakebells(100):REM Scale of C
 major
   80 ON ERROR PROCexit
   90 REPEAT
  100 RESTORE
  110 REPEAT
  120 READn,d$:
  130 IF NOTn PROCplay(n,d$):UNTILO
  140 UNTILn
  150 UNTIL FALSE
  160 DATA 9,s,8,s,7,s,6,s,5,s,4,s,3,s,2
,m,-1,-1
  170 :
  180 DEFPROCexit
  190 COLOUR131:COLOURO
  200 VDU28,1,28,38,18,12,10
  210 REPORT
  220 END
  230 :
  240 DEFPROCprintarm(robot,arm,po$)
  250 PRINTTAB(robot*8+(arm-1)*6,4);
  260 IF po$="U" PRINTarmup$ ELSE PRINTa
rmdown$
  270 ENDPROC
  280 :
  290 DEFPROCsoundon(n%)
  300 SOUND&11,1,b%(n%),255
  310 SOUND&12,1,b%(n%),255
  320 ENDPROC
  330 :
  340 DEFPROCsoundoff
  350 SOUND&11,0,0,0
  360 SOUND&12,0,0,0
  370 ENDPROC
  380 :
  390 DEFPROCwait(t%)
  400 T%=TIME+t%
  410 REPEAT UNTIL TIME>T%
  420 ENDPROC
  430 :
  440 DEFPROCgetarms
  450 armdown$=$&900
  460 armup$=$&930
  470 VDU26
  480 COLOUR 128:COLOUR1
  490 ENDPROC
  500 :
  510 DEFPROCmakebells(tonic):REM this i
s the key note
  520 DIMb%(10):REM 10 bells
  530 b%(1)=tonic-4
  540 RESTORE 580
  550 FOR bell=2 TO 10
  560 READtone%:b%(bell)=b%(bell-1)+tone
%
  570 NEXT
  580 DATA4,8,8,4,8,8,8,4,8
  590 ENDPROC
  600 :
  610 DEFPROCrding(r%,a%,time)
  620 PROCprintarm(r%,a%,"U")
  630 PROCsoundon(r%*2+a%)
  640 PROCwait(time)
  650 PROCprintarm(r%,a%,"D")
  660 ENDPROC
  670 :
  680 DEFPROCrrest(time)
  690 PROCsoundoff
  700 PROCwait(time)
  710 ENDPROC
  720 :
```

Continued ▶

◀ Joe's listing 2 continued

```
  730 DEFPROCplay(n%,tv$)
  740 IF n%=0 PROCrrest(FNrdur(tv$)):END
PROC
  750 LOCALr%,a%
  760 r%=(n%-1) DIV 2
  770 a%=n%-(r%*2)
  780 PROCrding(r%,a%,FNrdur(tv$))
  790 ENDPROC
  800 :
  810 DEFFNrdur(nm$)
  820 LOCALn$,n
  830 n$=LEFT$(nm$,1)
  840 IFn$="." nm$=MID$(nm$,2,LENnm$)
  850 n=INT(2^(INSTR("dsqcmsb",nm$)-1)
  860 IFn$="." THEN n=INT(n+n/2)
  870 =n*2
  880 :
  890 DEFPROCk(n,tv$)
  900 VDU26,17,1,17,128
  910 PROCplay(n,tv$)
  920 VDU17,131,17,0,28,1,28,38,18,12,10
  930 ENDPROC
```

Listing 3. Robot language

```
   10 REM Robot language
   20 REM by Joe Telford
   30 REM for BBC B/B+/M/C/E
   40 REM (c) Acorn User May 1987
   50 :
   60 CLOSE #0
   70 PROCgetarms
   80 PROCmakebells(100):REM Scale of C
 major
   90 DIMn%(100),t$(100)
  100 max%=100:ptr%=0:tempo=2
  110 title$="Untitled":author$="Anon."
  120 ON ERROR PROCexit
  130 VDU17,131,17,0,28,1,28,38,18,12,10
  140 REPEAT:COLOUR 1
  150 PRINT'"(N)ew (E)nter (S)ave (A)uth
or (T)empo"'"(L)oad (P)lay (Q)uit"
  160 COLOUR 0
  170 INPUT "Which? "com$
  180 com$=CHR$(ASC(LEFT$(com$,1)) AND 2
23)
  190 IF com$="S" PROCsave:UNTILO
  200 IF com$="T" PROCtempo:UNTILO
  210 IF com$="A" PROCtitle:UNTILO
  220 IF com$="L" PROCload:UNTILO
  230 IF com$="N" ptr%=0:VDU11:PRINTTAB(
10,VPOS);"Music memory cleared!":UNTILO
  240 IF com$="E" PROCenter:UNTILO
  250 IF com$="P" PROCp:UNTILO
  260 UNTILcom$="Q"
  270 PRINT"Ended!"'
  280 END
  290 :
  300 DEFPROCtitle
  310 PRINT"Title is....?"
  320 INPUT""title$
  330 PRINT"Author is....?"
  340 INPUT""author$
  350 ENDPROC
  360 :
  370 DEFPROCtempo:
  380 PRINT"current tempo is ";tempo
  390 REPEAT
  400 INPUT"new tempo is      "tempo
  410 UNTIL tempo>0 AND tempo<10
  420 ENDPROC
  430 :
  440 DEFPROCenter
```

Continued ▶

◄ Joe's listing 3 continued

```
450 REPEAT:IF ptr%=max%:UNTILTRUE:VDU1
1:PRINTTAB(10,VPOS)"Music memory Full!":
ENDPROC
460 PRINT
470 REPEAT:VDU11:PRINT"note ";ptr%" ";
:INPUTn%(ptr%):UNTIL n%(ptr%)>0 AND n%(p
tr%)<11
480 REPEAT:VDU11:INPUTTAB(20,VPOS);"Ti
me value? "t$(ptr%):UNTIL FNrdur(t$(ptr%
))>0
490 ptr%=ptr%+1
500 UNTIL0
510 :
520 DEFPROCp
530 IF ptr%=0 VDU11:PRINTTAB(10,VPOS);
"No music in memory!":ENDPROC
540 INPUT'"Play Score how many times?
"times
550 IF times=0:ENDPROC
560 CLS
570 PRINT'':PROCdbh(title$)
580 PRINT'':PROCdbh(author$)
590 VDU26,17,1,17,128
600 FOR loop%=1 TO times
610 FOR note=0 TO ptr%-1
620 PROCplay(n%(note),t$(note))
630 NEXT,
640 VDU17,131,17,0,28,1,28,38,18,12,10
650 ENDPROC
660 :
670 DEFPROCsave:
680 IF ptr%=0 VDU11:PRINTTAB(10,VPOS)"
No music in memory!":ENDPROC
690 INPUT"filename? "f$
700 ch%=OPENUPf$:IF ch%>0:CLOSE#ch%:PR
INT'"That score already exists!":ENDPROC
710 ch%=OPENOUTf$
720 CLS
730 PRINT"Music score: "f$'"Saving...P
lease wait"'STRING$(ptr%,".")
740 PRINT#ch%,title$,author$
750 PRINT#ch%,ptr%
760 FOR note= 0 TO ptr%:PRINT#ch%,n%(n
ote),t$(note)
770 PRINTTAB(0,0);"Music score: "f$'"S
aving...Please wait"'STRING$(ptr%-note,"
.");STRING$(note," ")
780 NEXT
790 CLOSE #ch%
800 PRINT"Saved!"
810 ENDPROC
820 :
830 DEFPROCload
840 IF ptr%>0 VDU11:PRINTTAB(10,VPOS)"
Music already in memory!":ENDPROC
850 INPUT"filename? "f$
860 ch%=OPENUPf$:IF ch%=0:CLOSE#ch%:PR
INT'"No such score!":ENDPROC
870 CLS
880 INPUT#ch%,title$,author$
890 INPUT#ch%,ptr%
900 PRINT"Music score: "f$'"Loading...
Please wait"'STRING$(ptr%,".")
910 FOR note= 0 TO ptr%:INPUT#ch%,n%(n
ote),t$(note)
920 PRINTTAB(0,0);"Music score: "f$'"L
oading...Please wait"'STRING$(ptr%-note,
".");STRING$(note," ")
930 NEXT
940 CLOSE #ch%
950 PRINT"Loaded!"
960 ENDPROC
970 :
980 DEFPROCexit
```

Continued ►

◄ Joe's listing 3 continued

```
990 COLOUR131:COLOUR0
1000 VDU28,1,28,38,18,12,10
1010 IF ERR=17 ENDPROC
1020 REPORT
1030 END
1040 :
1050 DEFPROCprintarm(robot,arm,po$)
1060 PRINTTAB(robot*8+(arm-1)*6,4);
1070 IF po$="U" PRINTarmup$ ELSE PRINTa
rmdown$
1080 ENDPROC
1090 :
1100 DEFPROCsoundon(n%)
1110 SOUND&11,1,b%(n%),255
1120 SOUND&12,1,b%(n%),255
1130 ENDPROC
1140 :
1150 DEFPROCsoundoff
1160 SOUND&11,0,0,0
1170 SOUND&12,0,0,0
1180 ENDPROC
1190 :
1200 DEFPROCwait(t%)
1210 T%=TIME+t%
1220 REPEAT UNTIL TIME>T%
1230 ENDPROC
1240 :
1250 DEFPROCgetarms
1260 armdown$=$&900
1270 armup$=$&930
1280 VDU26
1290 COLOUR 128:COLOUR1
1300 ENDPROC
1310 :
1320 DEFPROCmakebells(tonic):REM this i
s the key note
1330 DIMb%(10):REM 10 bells
1340 b%(1)=tonic-4
1350 RESTORE 1390
1360 FOR bell=2 TO 10
1370 READtone%:b%(bell)=b%(bell-1)+tone
%
1380 NEXT
1390 DATA4,8,8,4,8,8,8,4,8
1400 ENDPROC
1410 :
1420 DEFPROCrding(r%,a%,time)
1430 PROCprintarm(r%,a%,"U")
1440 PROCsoundon(r%*2+a%)
1450 PROCwait(time)
1460 PROCprintarm(r%,a%,"D")
1470 ENDPROC
1480 :
1490 DEFPROCrrest(time)
1500 PROCsoundoff
1510 PROCwait(time)
1520 ENDPROC
1530 :
1540 DEFPROCplay(n%,tv$)
1550 IF n%=0 PROCrrest(FNrdur(tv$)):END
PROC
1560 LOCALr%,a%
1570 r%=(n%-1) DIV 2
1580 a%=n%-(r%*2)
1590 PROCrding(r%,a%,FNrdur(tv$))
1600 ENDPROC
1610 :
1620 DEFFNrdur(name$)
1630 LOCALn$,n
1640 n$=LEFT$(name$,1)
1650 IFn$="." name$=MID$(name$,2,LENnam
e$)
```

Continued ►

◀ Joe's listing 3 continued

```
1660 n=INT(2^(INSTR("dsqcmsb",name$)-1)
)
1670 IFn$="." n=INT(n+n/2)
1680 =n*tempo
1690 :
1700 DEFPROCk(n,tv$)
1710 VDU26,17,1,17,128
1720 PROCplay(n,tv$)
1730 VDU17,131,17,0,28,1,28,38,18,12,10
1740 ENDPROC
1750 :
1760 DEFPROCdbh(x$)
1770 LOCAL char%,c%
1780 c%=&70
1790 FOR char%=1 TO LENx$
1800 ?c%=ASC(MID$(x$,char%,1))
1810 A%=10
1820 X%=(c% MOD &100)
1830 Y%=(c% DIV &100)
1840 CALL&FFF1:REM osword
1850 VDU23,141,c%?1,c%?1,c%?2,c%?2,c%?3
,c%?3,c%?4,c%?4
1860 VDU141,10,8
1870 VDU23,141,c%?5,c%?5,c%?6,c%?6,c%?7
,c%?7,c%?8,c%?8
1880 VDU141,11
1890 NEXTchar%
1900 ENDPROC
```

See Inspired Inscriptions, page 91

Listing 1. *Desalet* letter designer

```
10 REM Desalet letter designer
20 REM by George Yetts
30 REM for BBC B/B+/M/C
40 REM (c) Acorn User May 1987
50 :
60 IF PAGE>&1200 PRINT"PAGE must be &
1200":END
70 MODE4:HIMEM=&2FFF
80 VDU23;8202;0;0;0;:*FX229,1
90 PRINTTAB(9,2)"Character Designer"
100 PRINTTAB(9,3)STRING$(18,"_")
110 PRINTTAB(10,12)"Clear data store"
120 PRINTTAB(11,14)"memory area  ?"
130 PRINTTAB(13,17)"Enter  Y/N"
140 VDU7:PROCclm(0):Q%=1
150 ONERROR PROCerr
160 C%=0:E%=0:R%=0:S%=0:X%=7:Y%=999
170 *FX4,1
180 VDU28,24,31,39,0
190 GCOLO,1:MOVE791,408
200 DRAW791,568:DRAW1271,568
210 DRAW1271,408:DRAW791,408
220 PROCgr:PROCcur
230 PRINTTAB(4,0)"DESALET"
240 PRINTTAB(4,1)STRING$(7,"_")
250 PRINT"Cursors to move"
260 PRINT"SPACE to plot"
270 PRINT"DELETE to unplot";
280 PRINT"G - char. <- set";
290 PRINT"M - char. -> set";
300 PRINT"N - new char."
310 PRINT"V - view char."
320 PRINT"S - SAVE set"
330 PRINT"L - LOAD set"
340 PRINT"W - Wipe set"
350 PRINT"CTRL/@ - exit"
360 PRINT"* - * commands"
```

Continued ▶

◀ *Desalet* listing 1 continued

```
370 PRINTTAB(0,23)"Load a file or"
380 PRINT'"create New one ?"
390 PRINT"Enter L or N"
400 CLEAR:osc%=&CE0
410 VDU7:REPEAT:*FX15,1
420 g%=GET
430 IFg%=42 INPUTcom$:PROCoscli(com$)
440 IFg%=139 PROCup
450 IFg%=138 PROCdown
460 IFg%=136 PROCleft
470 IFg%=137 PROCright
480 IFg%=32 PROCfill:PROCcur
490 IFg%=127 PROCdel:PROCcur
500 IF(g% AND&DF)=86 PROCvw
510 IF(g% AND&DF)=83 PROCsave
520 IF(g% AND&DF)=76 PROCload
530 IF(g% AND&DF)=77 PROCchmem
540 IF(g% AND&DF)=78 PROCnwch
550 IF(g% AND&DF)=71 PROCgtch
560 IF(g% AND&DF)=87 PROCclm(1)
570 UNTIL g% = 0
580 PROCalert:S%=1:*FX4
590 VDU28,24,31,39,20,12:PROCquery
600 MODE7:HIMEM=&2FFF:*FX229
610 END
620 :
630 DEF PROCgr
640 VDU24,0;0;767;1023;
650 FORhgr%=0 TO767 STEP32:MOVEhgr%,0
660 IFhgr% MOD256=0 DRAWhgr%,1023:NEXT
:ELSEPLOT21,hgr%,1023:NEXT
670 FORvgr%=0 TO1023 STEP32:MOVE0,vgr%
680 IF vgr% MOD256=0 DRAW767,vgr%:NEXT
:ELSEPLOT21,767,vgr%:NEXT
690 MOVE0,1023:DRAW767,1023:DRAW767,0
700 MOVEX%,Y%:VDU29,X%;Y%;
710 ENDPROC
720 :
730 DEF PROCup
740 PROCcur:Y%=Y%+32:IFY%>999 Y%=999
750 VDU29,X%;Y%;:PROCcur
760 ENDPROC
770 :
780 DEF PROCdown
790 PROCcur:Y%=Y%-32:IFY%<7 Y%=7
800 VDU29,X%;Y%;:PROCcur
810 ENDPROC
820 :
830 DEF PROCleft
840 PROCcur:X%=X%-32:IFX%<7 X%=7
850 VDU29,X%;Y%;:PROCcur
860 ENDPROC
870 :
880 DEF PROCright
890 PROCcur:X%=X%+32:IFX%>743 X%=743
900 VDU29,X%;Y%;:PROCcur
910 ENDPROC
920 :
930 DEF PROCfill
940 VDU29,X%;Y%;
950 MOVE4,20:MOVE20,20:PLOT85,4,4
960 MOVE20,4:MOVE20,20:PLOT85,4,4
970 ENDPROC
980 :
990 DEF PROCdel
1000 VDU29,X%;Y%;
1010 GCOL0,0:PROCfill:GCOL0,1
1020 ENDPROC
1030 :
1040 DEF PROCcur
1050 VDU29,X%;Y%;:GCOL4,0
1060 MOVE4,12:DRAW20,12
```

Continued ▶

◀ *Desalet* listing 1 continued

```
1070 MOVE12,4:DRAW12,20:GCOL0,1
1080 ENDPROC
1090 :
1100 DEF PROCsave
1110 VDU28,25,18,38,15,12
1120 VDU28,24,31,39,24,12,7
1130 PROCms(1,0,0):INPUTTAB(4)f$
1140 IFf$="" f$="Noname"
1150 PROCoscli("SA. "+f$+" 3000 5800")
1160 VDU28,24,26,39,24,12
1170 VDU28,25,18,38,15
1180 PROCms(4,3,0):PROCfin
1190 ENDPROC
1200 :
1210 DEF PROCvw
1220 VDU29,0;0;28,25,18,38,15,12,7
1230 PROCms(2,2,0):n%=0
1240 FORvbk%=0 TO3
1250 FORhbk%=0 TO2
1260 FORrow%=0TO7
1270 ?(&C70+n%)=0
1280 FORcol%=7 TO0 STEP-1
1290 hgr%=15+((7-col%)*32)+(256*hbk%)
1300 vgr%=1015-(row%*32)-(vbk%*256)
1310 IF POINT(hgr%,vgr%)= 1 ?(&C70+n%)=
?(&C70+n%)+2^col%
1320 NEXTcol%
1330 n%=n%+1
1340 NEXTrow%
1350 NEXThbk%
1360 NEXTvbk%
1370 VDU28,24,23,39,20,12
1380 dstp%=0:chstp%=0
1390 FORvbk%=1 TO4
1400 FORhbk%=1 TO3
1410 VDU23,224+chstp%
1420 FORdat%=0 TO7
1430 VDU?(&C70+dat%+dstp%)
1440 NEXTdat%
1450 dstp%=dstp%+8:chstp%=chstp%+1
1460 NEXThbk%
1470 NEXTvbk%
1480 ch%=224
1490 FORloop%=0 TO3
1500 FORloop1%=0 TO2
1510 VDU31,6+loop1%,loop%,ch%+loop1%
1520 NEXT
1530 ch%=ch%+3
1540 NEXT
1550 VDU28,25,18,38,15,12
1560 PROCms(4,3,0):PROCfin
1570 ENDPROC
1580 :
1590 DEF PROCload
1600 VDU28,25,18,38,15,12
1610 VDU28,24,31,39,20,12
1620 IFQ%= 1 THEN Q%= 0:ELSE PROCalert:
PROCquery
1630 IFR%=1 R%=0:ENDPROC
1640 VDU7:PROCms(3,0,2):INPUTTAB(4)f$
1650 PROCoscli("LOAD "+f$+" 3000")
1660 VDU12,28,25,18,38,15,12
1670 PROCms(4,3,0):PROCfin
1680 ENDPROC
1690 :
1700 DEF PROCchmem
1710 IF(E%= 0 AND(C%<32 ORC%>126)) THEN
PROCinput:ENDPROC
1720 IFE%=0 VDU28,25,18,38,15,12,28,24,
26,39,24,12,7
1730 IF E%=0 PROCms(5,0,0):INPUTTAB(13,
1)N%:ELSEN%=24
```

Continued ▶

◀ *Desalet* listing 1 continued

```
1740 VDU28,25,18,38,15:PROCpoints(1)
1750 d%=&3000+100*(C%-32)
1760 FORdatno%=1 TO96
1770 IFdatno% MOD24=1 ?(d%+datno%-1)=N%
:d%=d%+1
1780 ?(d%+datno%-1)=?(&B00+datno%)
1790 NEXT datno%
1800 IFE%=1 ENDPROC
1810 VDU28,24,26,39,24,12
1820 VDU28,25,18,38,15,12
1830 PROCms(4,3,0):PROCfin
1840 ENDPROC
1850 :
1860 DEF PROCgtch
1870 VDU28,24,27,39,20,12
1880 VDU28,25,18,38,15,12,7
1890 IF C% PROCalert:V%=1:PROCnquery
1900 PROCinput:VDU28,25,18,38,15,12,7
1910 d%=&3000+100*(C%-32)
1920 FORdatno%=1 TO96
1930 IFdatno% MOD24=1 d%=d%+1
1940 ?(&B00+datno%-1)=?(d%+datno%-1)
1950 NEXTdatno%
1960 PROCplotdata
1970 PROCms(4,3,0):PROCfin
1980 ENDPROC
1990 :
2000 DEF PROCinput
2010 VDU28,25,18,38,15,12
2020 VDU28,24,31,39,20,12,7
2030 PROCms(7,0,0)
2040 C%=GET:PRINTTAB(7,7)CHR$(C%)
2050 IF(C%<32 ORC%>126) SOUND0,-15,4,15
:VDU12:PROCms(10,0,0):g%=GET:PROCinput
2060 IFC%=32:PRINTTAB(4,7)"<SPACE>"
2070 PROCms(8,0,9):PRINTTAB(10,10)C%
2080 VDU28,24,26,39,20,12
2090 VDU28,25,18,38,15,7
2100 PROCms(4,3,0)
2110 ENDPROC
2120 :
2130 DEF PROCplotdata
2140 VDU28,25,18,38,15,12,7
2150 PROCms(9,0,1)
2160 FORX%=7 TO 767 STEP32
2170 FORY%=999 TO7 STEP-32
2180 PROCdel
2190 NEXTY%
2200 NEXTX%
2210 PROCpoints(0)
2220 ENDPROC
2230 :
2240 DEF PROCnwch
2250 VDU28,24,27,39,20,12
2260 VDU28,25,18,38,15,12,7
2270 IF Q%=1 Q%=0:PROCms(4,3,0):ENDPROC
2280 IF C% PROCalert:V%=0:PROCnquery
2290 VDU12:PROCms(9,0,1)
2300 FORX%=7 TO 767 STEP32
2310 FORY%=999 TO7 STEP-32
2320 PROCdel
2330 NEXTY%
2340 NEXTX%
2350 X%=7:Y%=999:PROCcur:PROCinput
2360 ENDPROC
2370 :
2380 DEF PROCoscli(osc$)
2390 LOCALX%,Y%
2400 $osc%=osc$
2410 X%=osc% MOD&100:Y%=osc% DIV&100
2420 CALL&FFF7
2430 ENDPROC
2440 :
```

Continued ▶

◀ *Desalet* listing 1 continued

```
 2450 DEF PROCclm(ms%)
 2460 IFms%=1 VDU28,25,18,38,15,12:PRINT
TAB(0,0);"Scrub Memory !"TAB(0,2);"Sure
(Y/N) ?":PROCalert
 2470 clrmem%=GET
 2480 IF(clrmem% AND&DF)=89 THEN FORmem%
=&3000 TO&57FF STEP4:!mem%=0:NEXT
 2490 VDU12:IFms%=1 PROCms(4,3,0)
 2500 PROCfin
 2510 ENDPROC
 2520 :
 2530 DEF PROCerr
 2540 PROCalert
 2550 VDU28,24,13,39,2,12
 2560 PRINTTAB(4,2)"ERROR"
 2570 PRINTTAB(1,4)"Saving data"
 2580 PRINTTAB(5,5)"then"
 2590 PRINTTAB(1,6)"closing down"
 2600 PRINTTAB(0,8)"taking 15 sec."
 2610 E%=1:PROCchmem
 2620 PROCoscli("SAVE rescue 3000 5800")
 2630 *FX4
 2640 VDU26,12
 2650 PRINT;"Error ";ERR;" at line ";ERL
 2660 END
 2670 :
 2680 DEF PROCfin
 2690 SOUND 1,-15,200,10
 2700 SOUND 1,-15,120,10
 2710 ENDPROC
 2720 DEFPROCalert
 2730 FORloop%=0 TO3
 2740 SOUND 1,-15,250,5
 2750 SOUND 1,-15,150,5
 2760 NEXT
 2770 ENDPROC
 2780 :
 2790 DEF PROCquery
 2800 PRINTTAB(0,0)"Sure you don't"
 2810 PRINTTAB(0,1)"want to SAVE"
 2820 PRINTTAB(0,2)"existing data"
 2830 PRINTTAB(0,3)"first ?"
 2840 PRINT''"Enter"'"S to SAVE"
 2850 IFS%=0 PRINT"L to LOAD":ELSE PRINT
"SPACE to exit"
 2860 g%=GET
 2870 IF (g% AND&DF)=83 THEN R%=1:VDU12:
PROCsave:ENDPROC
 2880 IFg%=32:ENDPROC
 2890 IF(g% AND&DF)<>76 VDU7:PROCquery
 2900 VDU12:PRINTTAB(0,0)"O.K. !"
 2910 ENDPROC
 2920 :
 2930 DEF PROCms(num%,xpos%,ypos%)
 2940 IFnum%=1 ms$="Enter filename"+CHR$
13+CHR$10+"  to SAVE"
 2950 IFnum%=2 ms$= "Processing"+CHR$13+
CHR$10+CHR$10+"  Please wait"
 2960 IFnum%=3 ms$="Enter filename"+CHR$
13+CHR$10+"  to LOAD"
 2970 IFnum%=4 ms$= "Choose"+CHR$13+CHR$
10+" from menu"
 2980 IFnum%=5 ms$= "How many columnsto
be saved"
 2990 IF num%= 7 ms$= "Enter character"+
CHR$13+CHR$10+"to process"+CHR$13+CHR$10
+CHR$10+"UPPER/lower case"+CHR$13+CHR$10
+"is significant !"
 3000 IF num%= 8 ms$= "ASCII character"+
CHR$13+CHR$10+"number ... "
 3010 IFnum%=9 ms$="  Clearing  "
 3020 IF num%=10 ms$= "MUST be in range"
```

Continued ▶

◀ *Desalet* listing 1 continued

```
+CHR$13+CHR$10+"ASCII 32 to 126"+CHR$13+
CHR$10+CHR$10+"Press  SPACE"+CHR$13+CHR$
10+"to continue"
 3030 PRINTTAB(xpos%,ypos%)ms$
 3040 ENDPROC
 3050 :
 3060 DEF PROCpoints(op%)
 3070 VDU12,7:PROCms(2,2,0)
 3080 IFop%=0:vof%=0:hof%=0:n%=0
 3090 IFop%=1:vof%=16:hof%=8:n%=1
 3100 PROCcur
 3110 FORvbk%=0 TO3
 3120 FORhbk%=0 TO2
 3130 FORcol%=0 TO7
 3140 IFop%=1 ?(&B00+n%)=0
 3150 FORrow%=7 TO0 STEP-1
 3160 VDU29,0;0;
 3170 vgr%=999+vof%-((7-row%)*32)-(vbk%*
256)
 3180 hgr%=7+hof%+(col%*32)+(256*hbk%)
 3190 X%=hgr%:Y%=vgr%
 3200 IFop%=0:IF?(&B00+n%)DIV(2^row%)=1
PROCfill:?(&B00+n%)=?(&B00+n%)-2^row%
 3210  IF op%= 1:IF POINT(X%,Y%)= 1 THEN
?(&B00+n%)=?(&B00+n%)+2^row%
 3220 NEXTrow%
 3230 n%=n%+1
 3240 NEXTcol%
 3250 NEXThbk%
 3260 NEXTvbk%
 3270 X%=7:Y%=999:PROCcur
 3280 VDU12
 3290 ENDPROC
 3300 :
 3310 DEF PROCnquery
 3320 VDU28,24,27,39,20
 3330 PRINTTAB(0,0)"Sure you don't"
 3340 PRINTTAB(0,1)"want to put"
 3350 PRINTTAB(0,2)"char. to memory"
 3360 PRINTTAB(0,3)"first ?"
 3370 PRINT"Enter"
 3380 PRINT"M to save first"
 3390 IFV%=0 PRINT"N for new now"
 3400 IFV%=1 PRINT"G to get now"
 3410 g%=GET
 3420 IF (g% AND&DF)=77 THEN T%=1:VDU12:
PROCchmem:ENDPROC
 3430 IFABS(74.5-(g% AND&DF))<>3.5 SOUND
0,-15,4,15:VDU28,25,18,38,15:PRINT"Enter
 N or M":PROCnquery
 3440 VDU28,24,31,39,20,12
 3450 VDU28,25,18,38,15,7
 3460 ENDPROC
```

Listing 2. *Modical* program

```
   10 REM Modical by George Yetts
   20 REM from Calligraphy by Mike Turne

   30 REM (Acorn User Sept 1986 p.93)
   40 REM for BBC B/B+/M/C
   50 REM (c) Acorn User May 1987
   60 :
   70 ONERROR PROCerror
   80 MODE6
   90 HIMEM=&2FFF
  100 FORI%=&3000 TO&5800 STEP4
  110 !I%=0
  120 NEXT
  130 CLEAR
  140 DIMM%(99),entry$(22)
```

Continued ▶

◀ *Desalet* listing 2 continued

```
150 font=&C00:osc%=&C10:F%=0:$font=""
160 VDU19,1,2,0,0,0
170 *FX15,1
180 REPEAT
190 PROCcreate
200 CLS
210 PRINTTAB(9,1)"PRINTING please ";
220 PRINT;"wait"
230 fullwidth=960
240 n1=fullwidth MOD256
250 n2=fullwidth DIV256
260 c=OPENUP(file$)
270 REPEAT
280 letter$=""
290 PROCfile
300 PROCcontrols
310 PROCswitchon
320 PROClinespace
330 PROCcentre
340 PROClayout
350 FORsection%=1 TO4
360 strikes%=0
370 PROCgrafix
380 PROCfill(lead)
390 PROCstrip(writing$)
400 VDU1,13
410 NEXT
420 UNTIL EOF#c
430 CLOSE#c
440 VDU3
450 VDU26:SOUND1,-15,200,10
460 SOUND1,-15,120,10:CLS
470 PRINTTAB(12,5);file$;" printed"
480 PRINTTAB(10,8)"More to print ";
490 PRINT;"(Y/N) ?"
500 G=GET
510 UNTIL(G AND&DF)=78
520 END
530 :
540 DEFPROCswitchon
550 VDU2,1,27,1,64
560 ENDPROC
570 :
580 DEFPROClinespace
590 VDU1,27,1,ASC("A"),1,8
600 ENDPROC
610 :
620 DEFPROCcentre
630 sp=0
640 spaces%=fullwidth
650 strikes%=0
660 FORN%=1 TOLEN(writing$)
670 PROCletter
680 IFletter$=CHR$(32) sp=sp+1
690 width%=M%(0)
700 spaces%=spaces%-width%
710 NEXT
720 ENDPROC
730 :
740 DEFPROCletter
750 LOCALI%
760 letter$=MID$(writing$,N%,1)
770 IF INSTR(font$,letter$)=0 letter$=
CHR$(32)
780 C%=ASC(letter$)-32
790 FORI%=0 TO99
800 M%(I%)=?(&3000+C%*100+I%)
810 NEXT
820 ENDPROC
830 :
840 DEFPROCgrafix
850 VDU1,27,1,ASC("L"),1,n1,1,n2
860 ENDPROC
```

Continued ▶

◀ *Desalet* listing 2 continued

```
870 :
880 DEFPROCstrip(w$)
890 FORN%=1 TOLEN(w$)
900 PROCletter
910 PROCprint
920 NEXT
930 right%=fullwidth-strikes%
940 IFright%>0 PROCfill(right%)
950 ENDPROC
960 :
970 DEFPROCfill(j%)
980 IFj%=0 ENDPROC
990 FORdata%=1 TOj%
1000 VDU1,0
1010 strikes%=strikes%+1
1020 NEXT
1030 ENDPROC
1040 :
1050 DEFPROCprint
1060 width%=M%(0)
1070 IFC%=0 PROCfill(width%):ENDPROC
1080 FORdata=1 TOwidth%
1090 dot%=M%(data+(section%-1)*25)
1100 VDU1,dot%
1110 strikes%=strikes%+1
1120 NEXT
1130 ENDPROC
1140 :
1150 DEFPROCcontrols
1160 lj=0:rj=0:ce=0:ms=0:control$=""
1170 IFLEFT$(writing$,1)=CHR$(128) THEN
control$=MID$(writing$,2,2):control=TRUE
:ELSElj=TRUE:control=FALSE
1180 IF control=TRUE THEN writing$=MID$
(writing$,4)
1190 ENDPROC
1200 :
1210 DEFPROClayout
1220 IFcontrol$="LJ" lj=TRUE
1230 IFcontrol$="RJ" rj=TRUE
1240 IFcontrol$="CE" ce=TRUE
1250 IFcontrol$="MS" ms=TRUE
1260 IFlj lead=0:spaces%=0
1270 IFrj lead=spaces%:spaces%=0
1280 IFce lead=spaces% DIV2:spaces%=0
1290 IFms lead=0:spaces%=spaces% DIVsp
1300 ENDPROC
1310 :
1320 DEFPROCfile
1330 writing$=""
1340 REPEAT
1350 x=BGET#c
1360 IFx<>13 writing$=writing$+CHR$(x)
1370 UNTILx=13
1380 ENDPROC
1390 :
1400 :
1410 DEFPROCerror
1420 CLOSE#0
1430 VDU3,26:CLS
1440 PRINT:REPORT:PRINT" at line ";ERL
1450 END
1460 :
1470 DEFPROCcreate
1480 LOCALI%,N%
1490 *K.0 |!|@LJ
1500 *K.1 |!|@RJ
1510 *K.2 |!|@CE
1520 *K.3 |!|@MS
1530 CLS:font$=""
1540 PRINTTAB(8)"File creator for ";
1550 PRINT;"Modical"
1560 PRINTTAB(8)STRING$(24,"_")
```

Continued ▶

◀ *Desalet* listing 2 continued

```
 1570 VDU28,0,24,39,2:PROCfont:CLS
 1580 I%=0:REPEAT
 1590 IF?(&3000+(I%*100))>0  font$=font$
+CHR$(32+I%)
 1600 I%=I%+1:UNTILI%>94
 1610 PRINT'"The following are ";
 1620 PRINT;"available in ";$font
 1630 IF LEFT$(font$,1)=" " THEN PRINT';
"<SPACE>";font$:ELSEPRINT';font$
 1640 VDU28,0,24,39,8
 1650 PRINT''''"Print an existing ";
 1660 PRINT;"file ? (Y/N)"
 1670 G=GET
 1680 IF(G AND&DF)=89 INPUT''"Enter file
name and press RETURN"''file$:ENDPROC
 1690 CLS
 1700 PRINT"Enter text as prompted"
 1710 PRINT"Enter control codes at start
of line"
 1720 PRINT"Left justify ...............
........ f0"
 1730 PRINT"Right justify ..............
........ f1"
 1740 PRINT"Centre text ................
........ f2"
 1750 PRINT"Pad with spaces between word
s ...... f3"
 1760 PRINT'"N.B. Only one control code
per line"
 1770 REPEAT
 1780 INPUT'"Enter number of lines (max
22) ....  "lines
 1790 UNTILlines<23 ANDlines>0
 1800 PRINT'"Maximum of 40 characters";
 1810 PRINT;" per line"
 1820 PRINTSTRING$(40,"_")
 1830 VDU28,0,24,39,21
 1840 VDU19,1,2,0,0,0
 1850 FORN%=1 TOlines
 1860 REPEAT
 1870 PRINT'"Enter line ";
 1880 IF N%<10 PRINT;" ";N%;: ELSEPRINT;
N%;
 1890 INPUTLINE"   "entry$(N%)
 1900 IFLEN(entry$(N%))>40 SOUND 0,-15,4
,15:PRINT"Line too long - try again !"
 1910 UNTILLEN(entry$(N%))<41
 1920 NEXT
 1930 VDU7
 1940 PRINT"Page completed"
 1950 PRINT"Name of file to be saved";
 1960 INPUT;" "file$
 1970 IFfile$="" file$="Caltemp"
 1980 c=OPENOUT file$
 1990 FORN%=1 TOlines
 2000 IF entry$(N%)="" THEN entry$(N%)=
CHR$(32)
 2010 FORletter =1 TO LEN(entry$(N%))
 2020 byte$=MID$(entry$(N%),letter,1)
 2030 byte=ASC(byte$)
 2040 IFbyte>128 byte=128
 2050 BPUT#c,byte
 2060 NEXTletter
 2070 BPUT#c,&D
 2080 NEXTN%
 2090 CLOSE#c
 2100 SOUND 1,-15,200,10
 2110 SOUND 1,-15,120,10
 2120 VDU26:CLS
 2130 PRINTTAB(8,8)"File saved as < ";
 2140 PRINT;file$;" >"
 2150 PRINT''"Print it now (Y/N) ?"
```

Continued ▶

◀ *Desalet* listing listing 2 continued

```
 2160 G=GET:IF(G AND&DF)=89 ENDPROC
 2170 PRINT'''"Create another ";
 2180 PRINT;"file (Y/N) ?"
 2190 G=GET:IF(G AND&DF)=89 PROCcreate
 2200 END
 2210 :
 2220 DEFPROCfont
 2230 CLS
 2240 PRINTTAB(0,4)"Enter filename of";
 2250 PRINT;" font to be used"
 2260 IFF%=1:PRINTTAB(34,4)"or"TAB(0,6)"
to continue with same font press RETURN"
 2270 INPUTTAB(16,10)f$:F%=1
 2280 IFf$="" ORf$=$font ENDPROC
 2290 $font=f$
 2300 PROCoscli("LOAD "+f$)
 2310 ENDPROC
 2320 :
 2330 DEFPROCoscli(osc$)
 2340 LOCALX%,Y%
 2350 $osc%=osc$
 2360 X%=osc% MOD&100:Y%=osc% DIV&100
 2370 CALL&FFF7
 2380 ENDPROC
```

Listing 3. *Convdat* program

```
   10 REM Convdat
   20 REM by George Yetts
   30 REM for BBC B/B+/M/C
   40 REM (c) Acorn User May 1987
   50 :
   60 MODE4:CLEAR:HIMEM=&2FFF
   70 IFPAGE<>&1200 PRINT"MUST be run at
&1200"
   80 DIMtot%(26)
   90 PRINTTAB(5,10)"Clearing data ";
  100 PRINT;"space in memory"
  110 PRINTTAB(13,15)"Please wait"
  120 FOR mem%=&3000 TO&57FF STEP4
  130 !mem%=0
  140 NEXT mem%
  150 CLS
  160 PROCchksm
  170 PRINTTAB(4,5)"What is the first ";
  180 PRINT;"character to save ?"
  190 INPUTTAB(10,6)""first$
  200 PRINTTAB(4,8)"What is the last ";
  210 PRINT;"character to save ?"
  220 INPUTTAB(10,9)""last$
  230 PRINTTAB(0,15)"The above must be a
continuous block of ASCII characters !"
  240 first%=ASC(first$)
  250 last%=ASC(last$)
  260 PRINTTAB(4,22)"What filename ";
  270 PRINT;"to SAVE ? "
  280 INPUTTAB(15,23)""f$
  290 CLS
  300 osc%=&C00
  310 PROCconv
  320 PROCoscli("SAVE "+f$+" "+STR$~(&30
00+100*(first%-32))+" "+STR$~(&3000+100*
(last%-31)))
  330  CLS:PRINTTAB(0,10)"Saved as ";f$;
SPC(7-LEN(f$));" ready to *LOAD into its
allotted slot in memory either alone, or
into an existing font set."
  340 :
  350 END
  360 :
  370 DEFPROCconv
  380 err%=0:err$=""
```

Continued ▶

◀ *Desalet* listing 3 continued

```
 390 PRINTTAB(13,10)"Processing"
 400 FORchar%=first% TO last%:tot%=0
 410 PRINTTAB(24,10)CHR$char%
 420 A%=char%-32
 430 REM See text re next line
 440 FORL%=0 TO2
 450 dataline=1570+50*(char%-65)+10*L%
 460 RESTOREdataline:READW%
 470 IFW%>24 W%=24
 480 tot%=tot%+W%
 490 ?(&3000+A%*100+L%*25)=W%
 500 FORB%=1 TOW%
 510 READd$:C%=EVAL("&"+d$):tot%=tot%+C
%
 520 ?(&3000+A%*100+B%+L%*25)=C%
 530 NEXTB%
 540 NEXTL%
 550 REM See text re next line
 560 ?(&3000+A%*100+75)=W%:tot%=tot%+W%
 570 IFtot%<> tot%(char%-first%) PRINT'
'"Data error in "CHR$char%:err%=1:err$=e
rr$+CHR$char%+CHR$44
 580 NEXTchar%
 590 IFerr% CLS:PRINTTAB(12,10)"Check d
ata !!"''"Errors in .... "''err$;CHR$127
:END
 600 ENDPROC
 610 :
 620 DEFPROCoscli(osc$)
 630 $osc%=osc$
 640 X%=osc% MOD&100:Y%=osc% DIV&100
 650 CALL&FFF7
 660 ENDPROC
 670 :
 680 :
 690 :
 700 :
 710 :
 720 DEF PROCchksm
 730 RESTORE 750
 740 FORI%=0 TO25:READd$:tot%(I%)=EVAL(
"&"+d$):NEXT
 750 DATA1229,18E7,1063,1A8B,1B62,1C36,
12C9,1281,0F9C,1735,0FE7,0897,1A03,160F,
154A,138D,1A68,1787,12B6,1927,106C,0C79,
14D8,1182,1164,1417
 760 ENDPROC
 770 :
 780 REM A
 790 DATA22,0,0,0,0,0,0,0,0,1,7,1C,70,F
0,FF,FF,F,0,0,0,0,0,0
 800 DATA22,0,0,0,0,1,7,1F,73,C3,3,3,3,
3,3,F3,FF,FF,F,0,0,0,0
 810 DATA22,1,7,1C,70,C0,80,80,80,80,80
,80,80,80,80,80,80,F0,FF,FF,F,1,2
 820 :
 830 REM B
 840 DATA21,0,10,3F,7F,FF,30,60,60,C0,C
0,C0,C0,C0,C0,C0,E3,FF,7F,3C,0,0
 850 DATA21,0,FF,FF,FF,30,30,30,30,30,3
0,30,30,30,78,FC,DC,9E,F,7,3,0
 860 DATA21,FF,FF,FF,E,7,3,3,3,3,3,3,3,
3,3,7,F,1E,FC,F8,F0,0,
 870 :
 880 REM C
 890 DATA19,0,1,7,1F,1C,38,70,60,E0,C0,
C0,C0,C0,C0,E0,F0,7F,3E,1C
 900 DATA19,7F,FF,FF,0,0,0,0,0,0,0,0,0,
0,0,0,80,0,0,0
 910 DATA19,F8,FC,FE,1F,F,7,3,3,3,3,3,7
,7,E,1C,38,60,80,0
 920 :
 930 REM D
```

Continued ▶

◀ *Desalet* listing 3 continued

```
 940 DATA22,0,0,40,C0,FF,FF,FF,C0,C0,C0
,C0,C0,C0,C0,C0,C0,E0,F0,F8,7F,3F,1F
 950 DATA22,0,0,0,FF,FF,FF,0,0,0,0,0,0,
0,0,0,0,0,0,0,FF,FF,FE
 960 DATA22,1,3,FF,FF,FF,3,3,3,3,3,3,3,
3,7,6,E,1C,38,F0,E0,80,0
 970 :
 980 REM E
 990 DATA23,0,10,20,60,FF,FF,FF,E0,E0,E
0,E0,E0,E0,E0,E0,E0,E0,E0,E0,E0,E0,C0,80
 1000 DATA23,0,10,30,7F,FF,FF,F0,70,70,7
0,70,70,60,40,0,0,0,0,0,0,0,0,0
 1010 DATA23,1,3,7F,FF,FF,87,7,7,7,7,7,7
,7,7,7,7,7,7,7,7,6,4,8
 1020 :
 1030 REM F
 1040 DATA23,10,20,60,FF,FF,FF,E0,E0,E0,
E0,E0,E0,E0,E0,E0,E0,E0,E0,E0,E0,E0,C0,8
0
 1050 DATA23,10,30,7F,FF,FF,F0,70,70,70,
70,70,70,60,40,0,0,0,0,0,0,0,0,0
 1060 DATA23,0,7F,FF,FF,81,2,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0
 1070 :
 1080 REM G
 1090 DATA20,0,1,7,1F,1C,38,70,60,E0,C0,
C0,C0,C0,C0,E0,F0,7F,3E,1C,0
 1100 DATA20,7F,FF,FF,0,0,0,0,0,2,4,C,1C
,1C,1C,1C,1C,1F,1F,1F,0
 1110 DATA20,F8,FC,FE,1F,F,7,3,3,3,3,3,7
,6,E,1C,7F,FF,FF,81,2
 1120 :
 1130 REM H
 1140 DATA20,0,10,3F,7F,FF,0,0,0,0,0,0,0
,0,0,0,0,10,3F,7F,FF
 1150 DATA20,0,7F,FF,FF,B8,38,38,38,38,3
8,38,38,38,38,38,38,7F,FF,FF,80
 1160 DATA20,7F,FF,FF,80,0,0,0,0,0,0,0,0
,0,0,0,7F,FF,FF,81,2
 1170 :
 1180 REM I
 1190 DATA15,0,0,10,20,60,E0,E0,FF,FF,FF
,E0,E0,E0,C0,80
 1200 DATA15,0,0,0,0,0,0,7F,FF,FF,80,0,0
,0,0,0
 1210 DATA15,1,3,7,7,7,7F,FF,FF,87,7,6,4
,8,0,0
 1220 :
 1230 REM J
 1240 DATA24,0,0,10,20,60,E0,E0,E0,E0,E0
,E0,E0,E0,E0,FF,FF,FF,E0,E0,E0,E0,E0,C0,
80
 1250 DATA24,0,0,0,0,0,0,0,0,0,0,0,0,0,F
F,FF,FF,0,0,0,0,0,0,0,0
 1260 DATA24,2,6,F,1F,7,3,3,3,3,3,3,6,E,
F8,F0,80,0,0,0,0,0,0,0,0
 1270 :
 1280 REM K
 1290 DATA19,0,10,3F,7F,FF,0,0,0,0,0,1,3
,6,C,18,30,60,C0,80
 1300 DATA19,0,FF,FF,FF,6,C,18,30,60,F8,
FE,1F,7,1,0,0,0,0,0
 1310 DATA19,FF,FF,FF,0,0,0,0,0,0,0,0,80
,E0,F8,7E,1F,7,1,2
 1320 :
 1330 REM L
 1340 DATA22,0,0,0,10,3F,7F,FF,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0
 1350 DATA22,0,0,0,7F,FF,FF,80,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0
 1360 DATA22,1,3,7F,FF,FF,87,7,7,7,7,7,7
,7,7,7,7,7,7,7,6,4,8
 1370 :
```

Continued ▶

◀ *Desalet* listing 3 continued

```
1380 REM M
1390 DATA27,0,10,3F,7F,FF,C,18,30,60,C0
,C0,C0,E0,7F,7F,3F,C,18,30,60,C0,C0,C0,E
0,FF,7F,3F
1400 DATA27,0,FF,FF,FF,0,0,0,0,0,0,0,0,
FF,FF,FF,0,0,0,0,0,0,0,0,FF,FF,FF,0
1410 DATA27,FF,FF,FF,0,0,0,0,0,0,0,0,FF
,FF,FF,0,0,0,0,0,0,0,0,FF,FF,FF,2,4
1420 :
1430 REM N
1440 DATA21,0,10,3F,7F,FF,6,C,18,30,60,
E0,C0,C0,C0,C0,C0,E0,FF,7F,3F,0
1450 DATA21,0,FF,FF,FF,0,0,0,0,0,0,0,0,
0,0,0,0,FF,FF,FF,0,0
1460 DATA21,FF,FF,FF,0,0,0,0,0,0,0,0,0,
0,0,0,FF,FF,FF,1,2,0
1470 :
1480 REM O
1490 DATA21,0,1,7,1F,1C,38,70,60,E0,C0,
C0,C0,C0,C0,E0,F0,F8,7F,3F,1F,0
1500 DATA21,7F,FF,FF,0,0,0,0,0,0,0,0,0,
0,0,0,0,FF,FF,FE,0
1510 DATA21,F8,FC,FE,1F,F,7,3,3,3,3,3,7
,6,E,C,38,F8,E0,80,0,0
1520 :
1530 REM P
1540 DATA20,0,10,3F,7F,FF,1C,30,60,60,C
0,C0,C0,C0,C0,C0,E0,78,7F,1F,F
1550 DATA20,0,7F,FF,FF,8C,6,6,3,3,3,3,6
,6,6,C,18,78,F0,E0,80
1560 DATA20,FF,FF,FF,C1,2,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0
1570 :
1580 REM Q
1590  DATA24,0,1,7,1F,3C,30,70,60,E0,C0
,C0,C0,C0,C0,E0,F0,F8,7F,3F,1F,0,0,0,0
1600 DATA24,7F,FF,FF,0,0,0,0,0,0,1,1,1,
1,0,0,0,0,FF,FF,FE,0,0,0,0
1610  DATA24,F8,FC,FE,1F,F,7,3,43,83,83
,83,C7,E6,FE,7C,3C,FE,EF,87,3,3,2,2,C
1620 :
1630 REM R
1640 DATA20,0,10,3F,7F,FF,30,60,E0,C0,C
0,C0,C0,C0,C0,E0,F0,7F,3F,1F,0
1650 DATA20,0,FF,FF,FF,18,18,18,18,18,1
8,18,18,3C,3E,6F,E7,C3,80,0,0
1660 DATA20,FF,FF,FF,0,0,0,0,0,0,0,0,0,
0,0,E0,FF,FF,1F,1,2
1670 :
1680 REM S
1690 DATA20,0,0,F,1F,3F,38,70,60,E0,C0,
C0,C0,C0,C0,E0,F0,7F,3E,1C,8
1700 DATA20,0,0,80,C1,E0,E0,60,70,30,30
,18,18,1C,C,E,7,7,3,1,0
1710 DATA20,3C,7E,FF,F,7,3,3,3,3,3,3,3,
3,7,7,1E,FC,F8,F0,0
1720 :
1730 REM T
1740 DATA24,10,20,60,E0,E0,E0,E0,E0,E0,
E0,FF,FF,FF,E0,E0,E0,E0,E0,E0,E0,E0,E0,C
0,80
1750 DATA24,0,0,0,0,0,0,0,0,0,0,FF,FF,FF,
0,0,0,0,0,0,0,0,0,0,0,0
1760 DATA24,0,0,0,0,0,0,0,0,0,FF,FF,FF,0,
0,0,0,0,0,0,0,0,0,0,0,0
1770 :
1780 REM U
1790 DATA20,0,10,3F,7F,FF,0,0,0,0,0,0,0
,0,0,0,0,10,3F,7F,FF
1800 DATA20,1,FF,FF,FE,0,0,0,0,0,0,0,0,
0,0,0,1,FF,FF,FE,0
1810 DATA20,F0,FC,FE,1F,7,3,3,3,3,3,7,6
,C,18,38,FF,FF,FF,1,2
```

Continued ▶

◀ *Desalet* listing 3 continued

```
1820 :
1830 REM V
1840 DATA18,10,30,7F,FF,F,0,0,0,0,0,0,0
,0,0,3,E,38,E0
1850 DATA18,0,0,0,F0,FF,FF,F,0,0,0,3,E,
38,E0,80,0,0,0
1860 DATA18,0,0,0,0,F0,FF,FF,F,38,E0,80
,0,0,0,0,0,0,0
1870 :
1880 REM W
1890 DATA26,10,30,7F,FF,F,0,0,10,30,7F,
FF,F,0,0,0,0,0,0,0,0,0,3,E,38,E0
1900 DATA26,0,0,0,F0,FF,FF,F,0,0,0,F0,F
F,FF,F,0,0,0,3,E,38,E0,80,0,0,0
1910 DATA26,0,0,0,0,F0,FF,FF,F,38,E0,
80,F0,FF,FF,F,38,E0,80,0,0,0,0,0,0,0
1920 :
1930 REM X
1940 DATA24,0,0,80,C0,F0,F8,7E,3F,F,7,1
,0,0,0,0,0,1,3,6,C,18,30,60,C0
1950 DATA24,0,0,0,0,0,0,0,0,0,C1,E3,F6,FE
,3F,3F,67,C1,80,0,0,0,0,0,0,0
1960 DATA24,1,3,6,C,18,30,60,C0,80,0,0,
0,0,C0,E0,F8,FE,3F,F,7,1,0,0,0
1970 :
1980 REM Y
1990 DATA19,11,3F,7F,FE,0,0,0,0,0,0,0,0
,0,0,0,11,3F,7F,FE
2000 DATA19,F8,FE,FF,7,3,1,1,1,1,1,1,3,
6,C,18,FF,FF,FF,0
2010 DATA19,0,0,2,86,8F,9F,87,83,83,83,
83,83,3,6,E,FC,F0,80,0
2020 :
2030 REM Z
2040 DATA24,0,0,0,10,20,60,E0,E0,E0,E0,
E0,E0,E0,E0,E1,E3,E6,EC,F8,F0,E0,C0,80,0
2050 DATA24,0,0,0,0,0,0,0,0,3,7,C,18,30
,E0,C0,0,0,0,0,0,0,0,0,0
2060 DATA24,1,3,7,F,1F,37,67,C7,87,7,7,
7,7,7,7,7,7,7,7,7,7,6,4,8
```

**Listing 4. Logo definer**

```
10 REM LOGO definer
20 REM by George Yetts
30 REM for BBC B/B+/M/C
40 REM (c) Acorn User May 1987
50 :
60 MODE 6
70 HIMEM = &3000
80 PRINT "Creating LOGO font"
90 FOR loop% = 0 TO &CE3 STEP 4
100 loop%!&3000 = 0
110 NEXT loop%
120 :
130 FOR loop% = &CE4 TO &E73
140 READ byte$
150 loop%?&3000 = EVAL("&"+byte$)
160 NEXT loop%
170 :
180 *SAVE LOGO 3000 +E74
190 :
200 DATA 18,0,0,0,0,0,0,0,0,0,0,0,1,
3,7,E,1C,1C,3C,3C,3C,3C,3C,3C
210 DATA 18,0,0,0,20,10,B,F,E,1F,18,20
,C0,C0,80,0,0,0,0,0,0,0,0,0
220 DATA 18,0,0,0,40,80,1,3,6,4,8C,4C,
C,C,C,6,3,1,1,3,7,F,1F,3F,3F
230 DATA 18,0,0,0,60,F0,F8,F8,F0,60,0,
3,F,3F,7F,FF,7F,3F,9F,CF,E1,F0,F9,FF,FF
```

Continued ▶

◀ *Desalet* listing 4 continued

```
  240 DATA 18,3C,3C,3C,3C,3C,3E,1F,1F,1F
,F,7,3,1,0,0,0,0,0,0,0,0,0,0
  250 DATA 18,0,1,3,7,F,1F,3F,FF,FF,FF,F
F,FF,FF,FF,7F,3C,0,0,0,0,0,0,0,0
  260 DATA 18,FF,FF,FF,FF,FF,FF,FF,FF,FE
,FC,F9,F3,E6,CC,18,18,18,19,F,7,1,0,0,0
  270 DATA 18,FF,FF,FF,FF,F9,F0,E1,8F,5F
,FF,BF,1F,1,1,0,0,C0,E0,F0,F0,E0,C0,0,0
  280 DATA 18,0,10,30,60,C0,C0,C0,C1,C3,
C6,FC,FE,FF,FF,FF,E7,C3,C3,C3,E7,FE,FF,F
C,FF
  290 DATA 18,0,0,0,18,30,60,C1,83,7,F,1
F,1F,3B,B1,F0,F0,F8,BC,E,F,3F,8F,3F,F
```

Continued ▶

◀ *Desalet* listing 4 continued

```
  300 DATA 18,0,0,1E,3F,7F,FF,FF,C0,80,8
0,0,0,80,80,C0,C0,7F,3F,0,0,0,0,0,0
  310 DATA 18,0,0,0,0,80,C0,E0,F0,78,3C,
1C,C,C,4,40,C0,80,0,0,0,0,0,0,0
  320 DATA 18,FF,FC,FF,FF,E7,C3,C3,C3,E7
,FF,FF,FF,FF,FE,CC,CC,C4,C6,43,61,30,10,
0,0
  330 DATA 18,8F,3F,8F,3F,8F,8E,DE,FC,F8
,F0,C1,E3,7F,1F,F,3,1,0,0,80,80,0,0,0
  340 DATA 18,0,0,0,0,0,0,1F,3F,60,C0,80
,80,80,80,80,80,C0,FF,7F,3F,1F,F,0,0
  350 DATA 18,0,0,0,0,0,0,80,C0,60,20,10
,0,4,4,C,1C,38,F0,E0,C0,80,0,0,0
```

See The Network Page, page 163

Listing 1. Econet control program

```
   10 REM *CONTROL sourc
e
   20 REM by John Shakes
haft and Robin Newman
   30 REM for BBC B/B+/M
/C with Net
   40 REM (c) Acorn User
 April 1987
   50 :
   60 base%=&B00:REM adj
ust as necessary
   70 osbyte=&FFF4
   80 osword=&FFF1
   90 oswrch=&FFEE
  100 eventv=&220
  110 :
  120 FORpass=0 TO 2 STE
P 2
  130 P%=base%
  140 [OPT pass
  150 .code
  160 PHP
  170 CMP #2
  180 BEQ transch
  190 PLP
  200 RTS
  210 .transch
  220 PHA
  230 TXA
  240 PHA
  250 TYA
  260 PHA
  270 LDA #227
  280 LDX #0
  290 LDY #0
  300 JSR osbyte
  310 PLA
  320 PHA
  330 TAY
  340 LDX #&B
  350 .loop
  360 LDA data,X
  370 STA blk,X
  380 DEX
  390 BPL loop
  400 STY blk+4
  410 LDA #9
  420 STA count
  430 .tx
  440 LDA #&10
  450 LDX #blk MOD 256
  460 LDY #blk DIV 256
  470 JSR osword
  480 .poll
  490 LDA #&32
  500 JSR osbyte
  510 TXA
  520 AND #&80
  530 BNE poll
  540 TXA
  550 AND #&C0
  560 BEQ txok
  570 DEC count
  580 BPL tx
  590 .txok
  600 LDY blk+4
  610 CPY #&A8
  620 BEQ kbdtog
  630 CPY #&A9
  640 BEQ sever
  650 CPY #&AC
  660 BCC continue
  670 CPY #&B0
  680 BCS continue
  690 LDA #227
  700 LDX #&90
  710 LDY #0
  720 JSR osbyte
  730 JMP continue
  740 .sever
  750 LDA #13
  760 LDX #2
  770 JSR osbyte
  780 LDA eventvold
  790 STA eventv
  800 LDA eventvold+1
  810 STA eventv+1
  820 LDA #229
  830 LDX #0
  840 LDY #0
  850 JSR osbyte
  860 CLV
  870 BVC exit
  880 .kbdtog
  890 LDA #1
  900 EOR kbd
  910 STA kbd
  920 CMP #1
  930 BNE exit
  940 LDA #7
  950 JSR oswrch
  960 CLV
  970 BVC exit
  980 .continue
  990 CPY #27
 1000 BNE exit
 1010 LDA #&7D
 1020 JSR osbyte
 1030 .exit
 1040 PLA
 1050 TAY
 1060 PLA
 1070 TAX
 1080 PLA
 1090 PLP
 1100 RTS
 1110 .data
 1120 OPT FNequb (&80)
 1130 OPT FNequb (&D7)
 1140 OPT FNequw (&FFFF)
 1150 OPT FNequd (0)
 1160 OPT FNequd (0)
 1170 .blk
 1180 OPT FNequb (&80)
 1190 OPT FNequb (&D7)
 1200 OPT FNequw (&FFFF)
 1210 OPT FNequd (0)
 1220 OPT FNequd (0)
 1230 .eventvold
 1240 OPT FNequw (0)
 1250 .count
 1260 OPT FNequb (9)
 1270 .kbd
 1280 OPT FNequb (1)
 1290 .start
 1300 LDA #229
 1310 LDX #1
 1320 LDY #0
 1330 JSR osbyte
 1340 LDA eventv
 1350 STA eventvold
 1360 LDA eventv+1
 1370 LDA eventvold+1
 1380 LDA #code MOD 256
 1390 STA eventv
 1400 LDA #code DIV 256
 1410 STA eventv+1
 1420 LDA #14
 1430 LDX #2
 1440 JMP osbyte
 1450 .end
 1460 ]
 1470 NEXT
 1480 :
 1490 PROCchecksum
 1500 PRINT" *SAVE CONTR
OL "+STR$~code+" "+STR$~
end+" "+STR$~start
 1510 END
 1520 :
 1530 DEFPROCchecksum
 1540 ch%=0
 1550 FOR Z%=code TO end
-1
 1560 ch%=ch%+?Z%
 1570 NEXT
 1580 IF ch%<>&6908 PRIN
T"Checksum error: Check
program and rerun.":END
 1590 ENDPROC
 1600 :
 1610 DEF FNequb (byte%)
 1620 ?P% = byte%
 1630 P% = P%+1
 1640 =pass
```

Continued ▶

◀ **Network listing 1 continued**

```
 1650 :
 1660 DEF FNequw (word%)
 1670 ?P% = word% MOD 25
6
 1680 P%?1 = word% DIV 2
56
 1690 P% = P%+2
 1700 =pass
 1710 :
 1720 DEF FNequd (double
%)
 1730 !P% = double%
 1740 P% = P%+4
 1750 =pass
```

**Listing 2. Econet slave program**

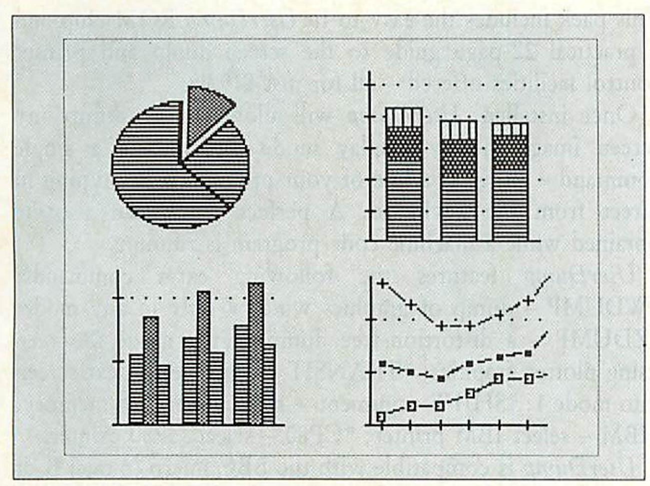
```
   10 REM *SLAVE source
   20 REM by John Shakes
haft and Robin Newman
   30 REM for BBC B/B+/M
/C with NET
   40 REM (c) Acorn User
 May 1987
   50 :
   60 base%=&B00: REM aj
ust as necessary
   70 osbyte=&FFF4
   80 osword=&FFF1
   90 osargs=&FFDA
  100 oswrch=&FFEE
  110 eventv=&220
  120 :
  130 FOR pass=0 TO 2 ST
EP2
  140 P%=base%
  150 [OPT pass
  160 .code
  170 PHP
  180 CMP #4
  190 BEQ readch
  200 PLP
  210 RTS
  220 :
  230 .readch
  240 PHA
  250 TXA
  260 PHA
  270 TYA
  280 PHA
  290 .poll
  300 LDA #&33
  310 LDX blk
  320 JSR osbyte
  330 CPX #&80
  340 BEQ gotone
  350 .exit
  360 PLA
  370 TAY
  380 PLA
  390 TAX
  400 PLA
  410 PLP
  420 RTS
  430 :
  440 .gotone
  450 LDX #blk MOD 256
  460 LDY #blk DIV 256
  470 LDA #&11
  480 JSR osword
  490 LDA #2
  500 LDY #0
  510 JSR osargs
  520 \ If A=2 NFS=3.34
  530 \ If A=1 NFS=3.40
or greater
  540 CMP #1
  550 BEQ not334
  560 LDA blk+5
  570 STA buffer
  580 .not334
  590 LDA buffer
  600 CMP #&A9
  610 BEQ sever
  620 CMP #&A8
  630 BEQ kbdtog
  640 CMP #27
  650 BNE ok
  660 LDA #&7D
  670 JSR osbyte
  680 CLV
  690 BVC exit2
  700 .kbdtog
  710 LDA #201
  720 LDX #1
  730 LDY #1
  740 JSR osbyte
  750 CLV
  760 BVC exit2
  770 .ok
  780 LDA #138
  790 LDX #0
  800 LDY buffer
  810 JSR osbyte
  820 .exit2
  830 JSR open
  840 CLV
  850 BVC exit
  860 .sever
  870 LDA #13
  880 LDX #4
  890 JSR osbyte
  900 LDA #201
  910 LDX #0
  920 LDY #0
  930 JSR osbyte
  940 LDA eventvold
  950 STA eventv
  960 LDA eventvold+1
  970 STA eventv+1
  980 CLV
  990 BVC exit
 1000 .open
 1010 LDY #&C
 1020 .loop
 1030 LDA data,Y
 1040 STA blk,Y
 1050 DEY
 1060 BPL loop
 1070 LDX #blk MOD 256
 1080 LDY #blk DIV256
 1090 LDA #&11
 1100 JSR osword
 1110 LDA blk
 1120 BNE opened
 1130 CLV
 1140 BVC open
 1150 .opened
 1160 RTS
 1170 :
 1180 .eventvold
 1190 OPT FNequw (0)
 1200 .data
 1210 OPT FNequb (0)
 1220 OPT FNequb (&7F)
 1230 OPT FNequb (&D7)
 1240 OPT FNequw (0)
 1250 OPT FNequd (buffer
)
 1260 OPT FNequd (buffer
+8)
 1270 .blk
 1280 OPT FNequb (0)
 1290 OPT FNequb (&7F)
 1300 OPT FNequb (&D7)
 1310 OPT FNequw (0)
 1320 OPT FNequd (buffer
)
 1330 OPT FNequd (buffer
+8)
 1340 .buffer
 1350 OPT FNequd (0)
 1360 OPT FNequd (0)
 1370 .start
 1380 LDA eventv
 1390 STA eventvold
 1400 LDA eventv+1
 1410 STA eventvold+1
 1420 LDA #code MOD 256
 1430 STA eventv
 1440 LDA #code DIV256
 1450 STA eventv+1
 1460 LDA #201
 1470 LDX #1
 1480 LDY #0
 1490 JSR osbyte
 1500 LDA #15
 1510 LDX #0
 1520 JSR osbyte
 1530 JSR open
 1540 LDA #14
 1550 LDX #4
 1560 JMP osbyte
 1570 .end
 1580 ]
 1590 :
 1600 NEXT
 1610 PROCchecksum
 1620 PRINT" *SAVE SLAVE
"+STR$~code+" "+STR$~en
d+" "+STR$~start
 1630 END
 1640 :
 1650 DEFPROCchecksum
 1660 ch%=0
 1670 FOR Z% = code TO e
nd
 1680 ch% = ch%+?Z%
 1690 NEXT
 1700 IF ch%<>&6A97 PRIN
T"Checksum error: Check
program and rerun.":END
 1710 ENDPROC
 1720 :
 1730 DEF FNequb (byte%)
 1740 ?P%=byte%
 1750 P% = P%+1
 1760 =pass
 1770 :
 1780 DEF FNequw (word%)
 1790 ?P% = word% MOD 25
6
 1800 P%?1 = word% DIV 2
56
 1810 P% = P%+2
 1820 =pass
 1830 :
 1840 DEF FNequd (double
%)
 1850 !P% = double%
 1860 P% = P%+4
 1870 =pass
```

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# OFFERS

CHARTSOFTWARE



# Improve your presentation with ViewChart

Do you use your micro to prepare figures? Perhaps in *ViewSheet* or *ViewStore*? Do you make printed reports? This business graphics program from *Acorn User* contributor Peter Sandford is aimed at anyone who uses figures, and wishes to improve the quality of their work.

*ViewChart* takes your numeric data from a *ViewSheet* file or *ViewStore* file, or manually, and plots various chart formats to screen. In one plot you can produce between one and five piecharts, stacked bar charts up to 25 bars, grouped bar charts up to 24 bars and line graphs with up to five lines each of 40 plotted points.

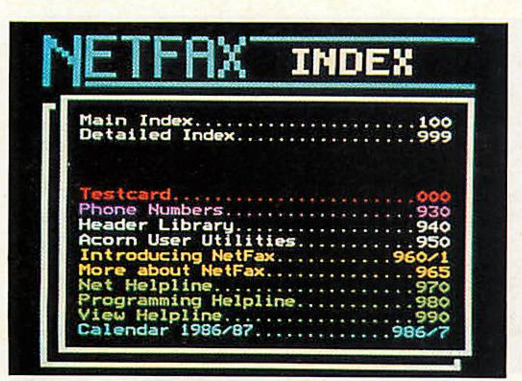
In practice, most business presentation data such as sales figures, departmental breakdowns, cost analyses and so on can be presented in a form even the boss will understand!

You can even add extra text and graphics to the completed chart prior to saving or printing. A screen dump program is provided, for Epson and compatible printers, which is specifically designed to fit the width of an A4 page. Instructions are provided on interfacing to other printers. *ViewChart* works in screen mode 0, using full shading effects, so what you see on screen is what you get on paper, and includes some tips on final presentation of graphics in documents.

*ViewChart* is supplied on 40-track 5.25-inch disc and works on the BBC models B and B+ and Master 128.

And the price of this professional software? Just £12.95.

DISCS




## Network utilities for better communication

The *Network Utilities* 80-track disc is the logical addition to your network, combining invaluable routines with a sophisticated yet easy-to-use teletext information system.

Included is *Netfax*, our own hybrid information system providing access to thousands of pages of information. Other special features are: a file locator and directory size finder; network manager utilities including a bridge compatible screen viewer and a 'notify all' facility.

Plus there are 150 *Netfax* pages covering instructions, help pages and sample indexes, all for £19.95.

DISCS




## Disc for all sideways RAM users

The *Sideways RAM Utilities* disc includes the following:

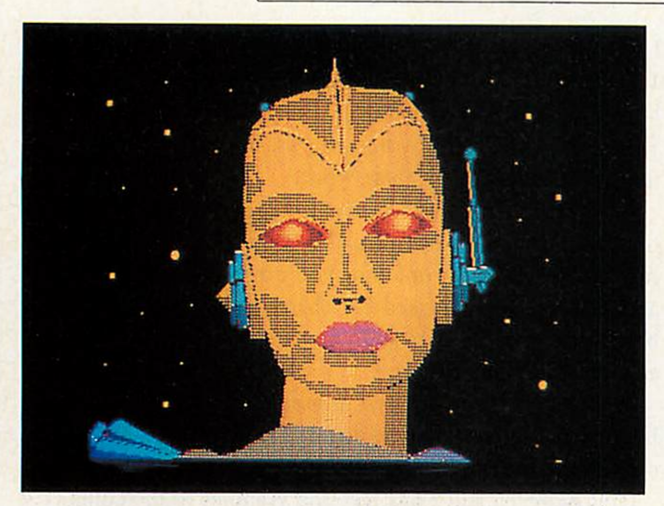
*RamPad* – your computer's answer to the pad and pen. *On-Screen Fonts* – a variety of print styles available in all graphics modes. * HLP ROM – add your own help text to call up when you're stuck. Standard ROM header for use when writing your own ROMs. * RLOOK to examine the contents of your ROMs and sideways RAM images.

There are many more utilities on this 40-track disc with a transfer program for 80-track users, and it's competitively priced at £9.95.

**Acorn User order form on page 130 – 24 hour telephone service (0672) 40825**

# OFFERS

D U M P R O M S



## Printer control with the UserDump ROM

This pack includes the easy-to-fit *UserDump* ROM chip and a practical 22-page guide to the screen dump and printer control facilities offered – all for just £19.95.

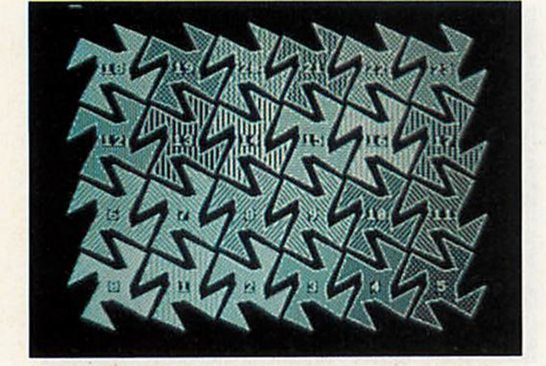
Once installed, *UserDump* will allow you to dump any screen image in any display mode by entering a single command – either as a line of your program or by typing in direct from the keyboard. A perfect dump can also be obtained while a machine code program is running.

*UserDump* features the following extra commands: *WDUMP – dump of graphics window only in any mode; *ZDUMP – a distortion-free dump of the mode 0 screen using plotter graphics; *TRANSIT – translate teletext screen into mode 1; *SHIFT ‹argument› – shift any area of memory; *IBM – select IBM printer; *CP80 – select CP80 printer.

*UserDump* is compatible with the BBC micro (model B or B+) fitted with operating system 1.2. Any earlier version will cause problems. *UserDump* is fully compatible with the Acorn 6502 second processor. It works with any printer which has single density and double density bit image graphics, including all Epson (LX, RX and FX) printers, Star Gemini and Delta, SG, SD and SR, Canon and Kaga NLQ. Also usable are the Shinwa and other CP80 printers.

There are many more commands available with *UserDump*, and details are available by writing to Seran, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

R O M S



## Your favourite Acorn User routines

Get *UserROM* for your favourite *Acorn User* routines.

Simply plug in the ROM chip and 19 routines are instantly accessible via star commands, including colfill with 27 colourful fills; dotfill providing 23 new black and white shades; bad program recovery; variable lister; function key lister; a graphics compiler; a circle drawing routine and a sound compiler. There are many demonstration programs and a 22 page manual. All for £19.95.

Full details are available by writing to Seran, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

R O M S

```
Assembler Extension ROM (AXR) 1.12
 BITS   (Use *BITS for help on OPT)
 ASSM <src> <OPT 1> (<OPT 2>) (<dest>)
 DSM (<address>) (<ROM>)
 LVAR
 STRIP <fsp> (<:>)
 OFFAXR  (Turn ROM OFF)
```

## Acorn User Assembler Extension ROM

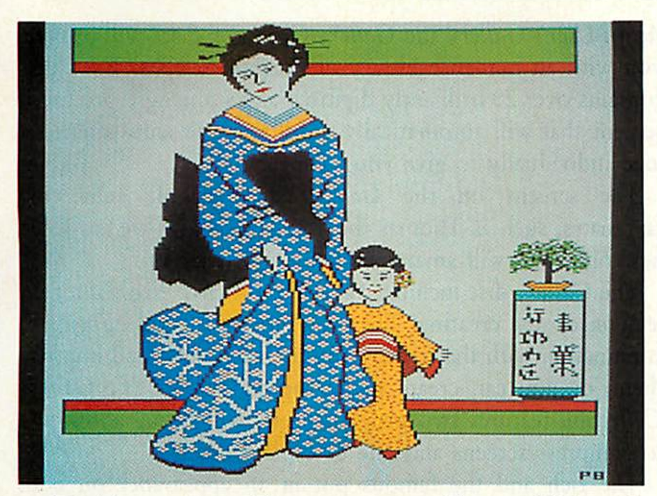
The *AXR* ROM, competitively priced at £19.95, is especially designed for use by machine code programmers. *AXR* adds a variety of options and commands to the Basic assembler, along with several new pseudo op codes, full Basic expression evaluation, and even the use of binary numbers. A disassembler is included in the software, and all 65C02 instructions can be used. *AXR* is compatible with Basic 1, 2 and Master.

Further details are available from Seran, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

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# OFFERS

P R O G R A M   L I S T I N G S




## Ring those bells with the May listings

Whether you choose cassette or disc, May's listings will have something to offer. The programs range from the creative to the exotic and practical. With the cassette at a mere £3.95 and the disc at only £5.95, they are a real bargain.

George Yetts' *Desalet* program takes you to new dimensions in letter designing. Adapted from Mike Turner's immensely popular *Calligraphy* program, *Desalet* allows you to design your own typefaces for posters, or you can even design your own personal letterhead.

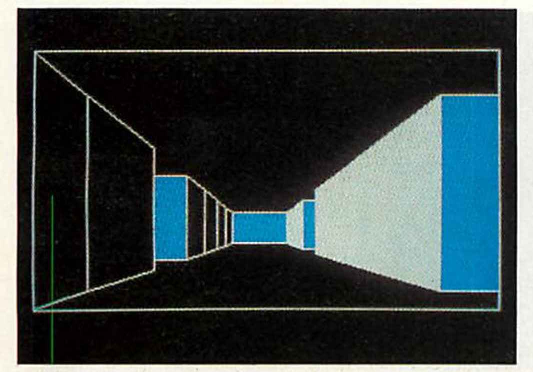
Joe Telford presents his *Rhythmical Rollicking Robots.* If you have ever longed to ring bells now's the time to let all your campanological leanings run riot with the bell ringing robots. You can write your own masterpieces, or have these enchanting fellows play your favourite tunes for you.

If you have been struggling to get complete circles dumped out and failed miserably, then you need Martin Phillips' Hints & Tips program on proportional screen dumps. With this program the completely round circle can be achieved.

Tessie Revivis offers us help with tackling the complex subject of sideways RAM, while Robin Newman shows how to use the Compact on a net. He also instructs us how one user can control another machine from his own.

Travel to the land of the rising sun to visit the beautiful kimonoed geisha girls with this month's graphics bonus, or simply stay at home with the kaleidoscopic Mandlebrots.

L I S T I N G S



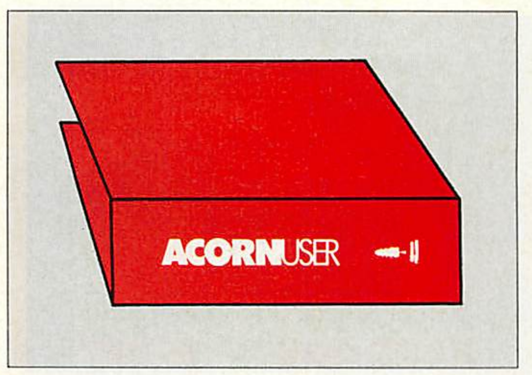
## Monthly disc and cassette subscriptions

Guarantee delivery of your monthly program listings by subscribing to our discs or cassettes, for the best quality utilities, graphics and entertainment.

New cassette subscribers receive a free *Games Compendium* cassette, and new monthly disc subscribers qualify for one of our grey cloth disc binders, to hold a year's discs. Or if you prefer, try us out for six months and save yourself money. See page 129 for details.

Whichever you choose you won't regret the investment. All offers are open to UK subscribers only.

B I N D E R S




## Vastly reduced prices for disc binders

Our grey cloth disc binder is supplied with its own protective slip case and is filled with six transparent inserts, which will hold a year's supply of 5.25-inch monthly discs, and it is currently available at the special price of just £6.95.

An *Acorn User* magazine binder is the best way to keep your precious copies in pristine condition. Our smart red binder features a wide spine with the capacity to hold a whole year's issues. For only £4.95 your magazines can last a lifetime.

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# OFFERS

GALLERY DISCS



## Two galleries of great graphics

*Acorn User's Gallery* and *Gallery Collection* discs will provide you with an immense library of graphics screens. Each disc contains over 20 brilliantly digitised and stunningly produced screens that will automatically scroll for your amusement, or load individually to give you a longer look.

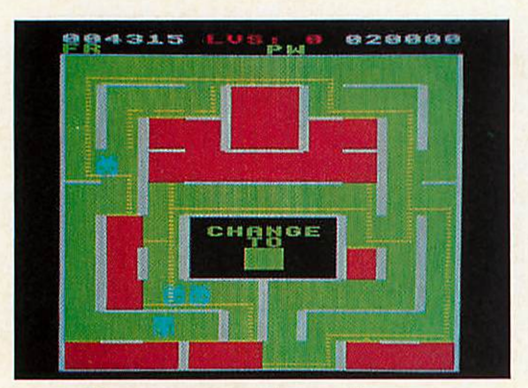
The screens on the *Gallery* disc include some old favourites, such as Thomas the Tank Engine, as well as some new ones that will amaze, tantalise and entertain.

The *Gallery* disc includes *Super Painter* and *Pixel Editor*, to let you do the creating. These two programs can be used in conjunction with the screens on the disc to alter and improve them, or you can create totally new graphics. The *Gallery Collection* features two programs, one which will allow you to compress screens and one to expand them.

The rich and the famous put in an appearance on both discs; Tony Hancock is on the *Gallery* disc, as is Max Headroom. Spitting Image and the Dallas crowd are in vivid technicolour on the *Gallery Collection*, along with Henry VIII and everyone's favourite: Bugs Bunny.

Both are also now available in 3.5-inch format, so all Compact users need not feel left out. Once you've marvelled at the *Gallery* and *Gallery Collection* discs, remember that the *Acorn User UserDump* ROM will enable you to print out the screens. The discs are available in 40-track, 80-track and 3.5in format – a snip at £6.95 each.

CASSETTES



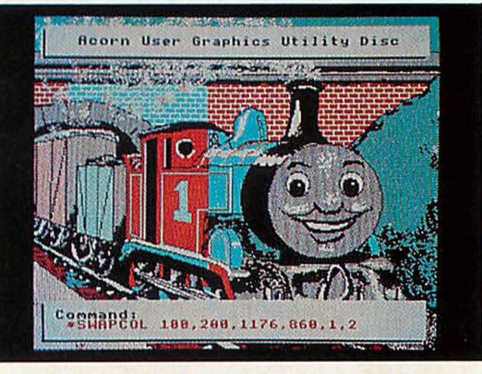

## Games galore in our compendium

Using this exciting cassette you can guide Shuggy around his garden; puzzle over *Puzzle*, and be *3-D* amazed. Or destroy submarines with *Run Silent, Run Deep*. And for the really adventurous, go round the *Acorn User* office.

Best of all, try the truly different *Adventure* game written especially for the *Games Compendium* cassette by Rob Anderson. It's excellent value at £3.95.

You will also find David Acton's *Spectramania* and *Quadline* on this cassette: beat your micro, get four in a row. All are easily transferred to disc.

DISCS




## Graphics utilities for your screens

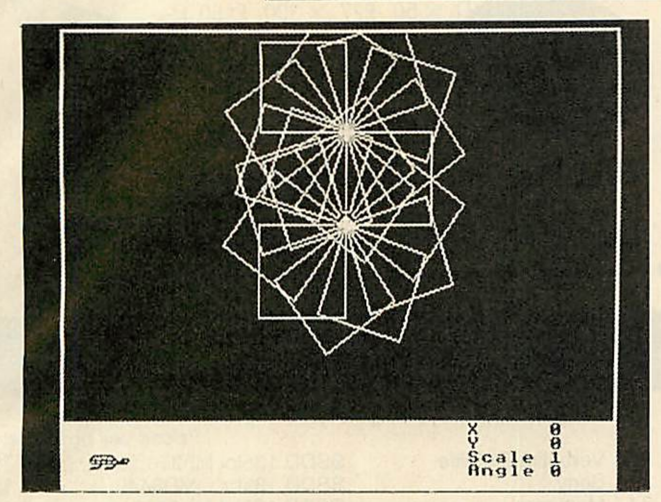
The 40-track *Graphics Utilities* disc, keenly priced at £7.95, features 16 machine code routines to manipulate blocks of graphics. Rotation and reflection are included with a screen compressor/expander, a colour flood-fill routine and three mode conversion commands.

With the Basic procedure library are multi-height, proportional and justified text and 'drop shadow' boxes. A teletext sceen editor gives point plotting, line drawing, rubber banding and flood fill, along with all mode 7 control codes. All can be used in your own programs.

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# OFFERS

E D U C A T I O N




# Easy learning with education disc

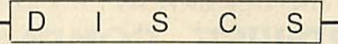
The *Acorn User Education* disc makes learning easy and entertaining. The disc is packed with useful programs, including *Eco-Fax*, the sophisticated viewdata-type database for use on Econet systems which comes with its own frame editor.

You can also have fun with the colourful version of *Turtle Logo*, the popular drawing program. Try plotting equations with Nigel Jennings graph program.

Graphics programs are the feature of this disc and they include *Bulletin*, which converts your micro into an electronic message board. Strings of up to 255 characters can be screened in large colourful sideways scrolling letters. Create screens with the drawing program *Easyplot* and then use the two display programs *Vufoil* and *Noticeboard* to show them off. *Vufoil* acts in place of an overhead projector whilst *Noticeboard* builds and displays your *Easyplot* screens.

We have also included two screen dumping programs: George Hill's all mode dumping routine for Epson-compatible printers may be incorporated into your own listings, and so may the teletext dumping routine which dumps in mode 7 to Epson FX80-compatible printers.

Our *Capitals* program will force all text into upper case. Budding Bachs can use *Tunemaker* to edit and play back their own masterpieces. This wonderful disc comes in 40-track format only, but is easily transferred to 80-track. The *Acorn User Education* disc is yours for only £7.95.



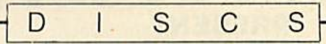
D I S C S

```
A. What are discs & disc drives?
B. Saving & loading BASIC programs
C. Catalogues, Directories & Libraries
D. Copying files & whole discs
E. Deleting files & stopping
   accidental deletion
F. All about auto-booting discs
G. All sorts of odd commands
H. Transferring BASIC programs from
   cassette to disc
I. Test on the DFS
J. About NAMEBUG
```

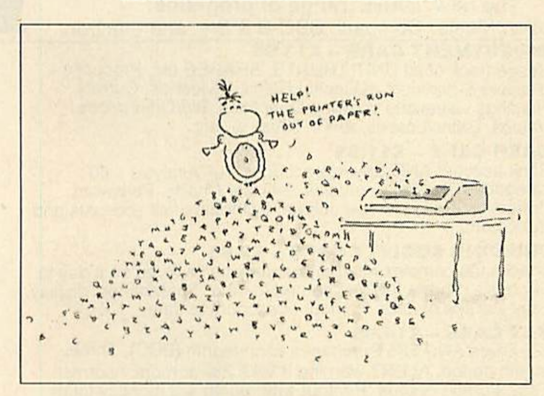
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It gives all the help you will ever need on one 80-track disc. The practical advice makes it an excellent introduction to the finer points of catalogues, directories and libraries, copying files and discs, transfer of Basic programs from cassette to disc, saving and loading Basic programs and much more. There's even a disc filing system simulator to check your progress.



D I S C S




## Printer advice with Printer Help disc

Often printer manuals don't fully cover the Master and BBC micro – our disc will help you to understand your printer's facilities for the low price of £7.95.

The *Printer Help* disc illustrates various print type styles, use of *Wordwise* and *View*, screen images and printer care. There is an ASCII standard codes table and clear diagrams illustrating stages of printer use including advice on what to do if things go wrong.

For compatibility details write to Seran, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

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# REVIEWS

## GAMES

# THE GAMES PAGE

**David Lawrence helps cheats to cheat and looks at the new releases, which cover racing cars, ghosts and tanks**

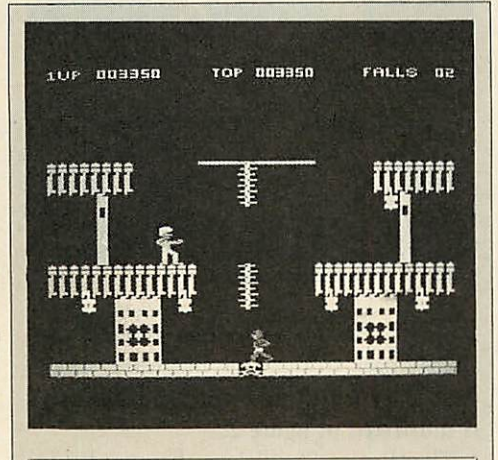
As promised, this issue features the *Repton 2* special. I hope that over the next couple of pages you will find the answers to your Reptillian problems! Many thanks go to Richard Hanson of Superior Software for the hints and to Rob Miller for the maps. The maps are proving very popular, so if you still haven't got a set, send a large stamped addressed envelope and a cheque for £1 to 'The Games Page'. The *Castle Quest* map and solution is also available for £1 and an sae. One of Rob's *Ravenskull* maps is available – the complete set of four should be ready very soon, again with hints from Richard Hanson.

Superior's next release (apart from the compilations mentioned in last month's news section) is entitled *Grand Prix Construction Set* and is based on Leisure Genius' *Scalextrix*, available for the Speccy and Commodore 64. It features user definable tracks (you get straights, curves, bridges and so on, just like in the original game) and a split screen – the top half displays the view from one car and bottom half, the view from the other. Two maps of the complete track with the position of the cars are also shown. Anyone who has seen the original *Scalextrix* or *Pitstop 2* on the Commodore will know what I mean.

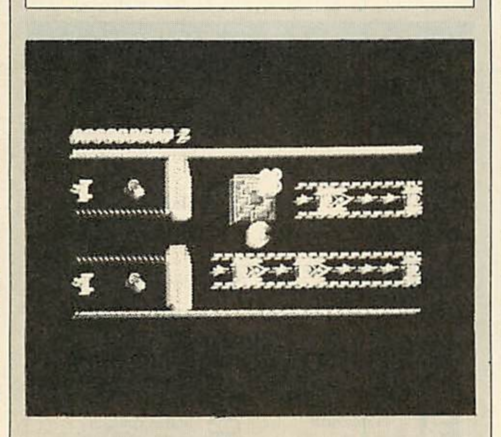
Other things to watch out for include a few new releases from Tynesoft. The first is a boxing game called *The Big KO* and a version of *Ghostbusters* called *Ghosthunter*. Finally a top secret version of a best selling American game should be available very soon. Stay tuned.

Wargaming fans will be interested in the follow up to *Sink the Bismarck* from Design People Software. *Tanks!* is a simulation of three famous tank battles and features scrolling landscapes with the occasional touch of 3D. I don't normally like war games, but this has been well written and is very playable, if difficult.

I mentioned last month the possibility of a cheat mode in *Psycastria* and that if you held I,L,T,D and N down on the title page, the game crashed. Well I have since found out that my copy is faulty and that the above does actually work. The game will then ask for a code word. Type Shotokan and you will have infinite lives. Thanks go to Stephen Gayler for the above.




```
  256 PRINT"Cheat?";:A$=GET$:I
FA$="Y"PROCcheat
  641 DEFPROCcheat
  642 ?&586F=&4C:?&5870=5C:?&5
871=&2F
  643 ?&1756=&4C:?&1757=73:?&1
758=&2F
  644 ?&1764=&A9:FORI%=0TO12:R
EADA$
  645 I%?&5873=EVAL("&"+A$):NE
XT
  646 ?&5586=1:ENDPROC
  647 DATA A2,B6,20,C1,11,D0,0
3,4C,88,17,4C,5A,17
```



**Cheat on *Bruce Lee* (top) or *Psycastria* (bottom). Listing 1 (centre) pokes into *Jet Set Willy 2***

I have been poking around with *Jet Set Willy 2* and have come up with the following: load the file called 'TES3', add the lines in listing 1 and re-save it as 'TES3'. Then CHAIN "LOADER" as usual. After the title screen, you'll be asked if you want to cheat. Press 'N' for the standard game or 'Y' for the 'enhanced' version. I won't tell you what they do but I will say that if you get stuck you may have to return.

Another useful poke comes from R J Stanton, to give you 50 'falls' in *Bruce Lee*. First set PAGE to &1700, then insert ?&25C8=50 one line after *LO.LEE in the file called 'Bruce'. This should enable you to finish the game. I am thinking of compiling a cheat sheet which will contain all the pokes you could ever want (well, most of them), so keep your infinite lives/start on any level/more energy pokes coming in. Label your envelope 'The Cheat Sheet' and make sure your pokes work on an original copy of the game and say if you are using tape or disc.

I've had two more requests for adventure help. Stephen Gayler (again!) would like to know what he needs to get a draft of, in the boardroom in *Hampstead*, while Ian Surman wants to get past the robot in *Stranded*. I would be very interested in any adventure maps, particularly of the larger games (like *Acheton*) or of mazes that have to be mapped by dropping objects.

Next month I hope to announce a *Sentinel* competition with some special prizes.

*Send all letters to The Games Page, Acorn User, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.*

GAMES

# REPTON UNRAVELLED

**Richard Hanson is managing director of Superior Software, perpetrator of *Repton 2*. Here he helps those who, a year on, still haven't solved it**

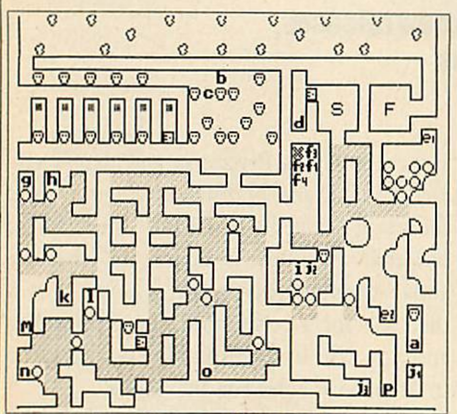
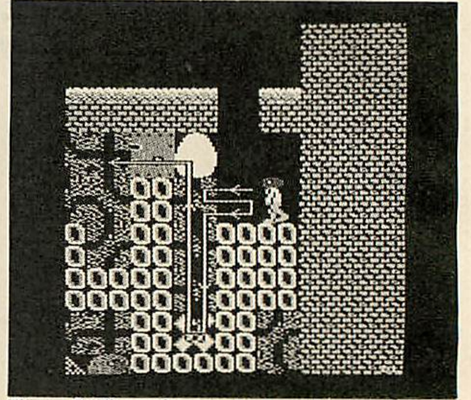

Figure 1. Part of area a, 16 screens square

Figure 2. The *Repton* Shuffle


Figure 3. Through a cracked egg in area d

Now that *Repton 3* is out and has followed its two predecessors into the best-seller charts, I feel I can offer some assistance to people still stuck on *Repton 2*.

*Repton 2* has 18 playing areas (called a to r) which are linked by a series of transporters. The start area (area a) is the most important because you keep returning to it, and it is also the final area if you manage to complete the game. Each area varies in size up to a maximum (area i) of 32 by 35 squares, or 20 times the size of your monitor screen.

## Area a

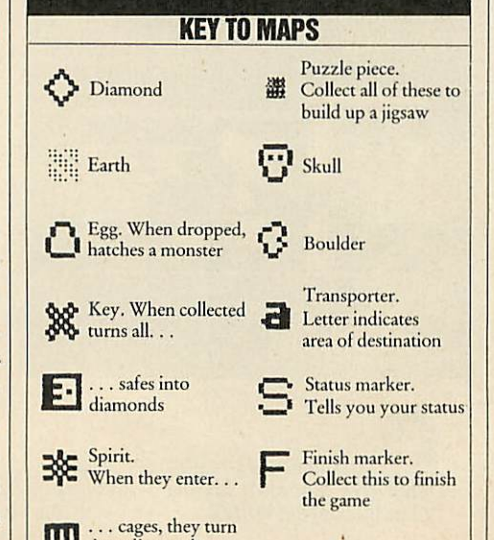
There are 22 transporters on area a, and the order in which they are used is crucial. For example, the transporters labelled f1, f2, f3, f4 must be taken in that order. The full sequence to use from area a is:

e1, e2, f1, f2, f3, f4, n, l, b, i, j1, j2, j3, k, p, o, h, a, c, d, m, g.

You will need to return to area a after completing each playing area (figure 1).

When using transporters e1 and e2, it is essential that e1 is taken before e2. So you must ensure that when the rocks fall from the alcove enclosing e1 they do not block the route to e2. All but one of the rocks must be diverted into the passage on the right-hand side of the area. This requires the player to use a technique that has become known among *Repton* aficionados as the '*Repton* Shuffle'. Repton can hold a rock on his head, but if he moves down he will be instantly killed by the rock. If, however, he moves to the left and then swiftly back to right (or vice-versa) he can push the rock to the right-hand side. This is illustrated in figure 2.

The '*Repton* Shuffle' was first needed for screen j of *Repton 1*. Several customers wrote to us in despair asking how to solve this screen – we told them that the solution required some lateral thinking, since the technique is simple but not immediately obvious. Frederic Friedel, a television producer from Hollenstett, West Germany, is a big *Repton* fan; he phoned us and remarked that his friend, a famous chess grandmaster, had become stuck on area j and was so badly perplexed at not solving the puzzle that it almost ruined his chess career!




## Area d

Another intriguing puzzle occurs in area d. Solving this makes use of the fact that in *Repton 2* it is possible for Repton to walk through a cracked egg. In figure 3 follow the arrows closely: walk under the egg then move to the right to let it fall. When it cracks (but before a monster is hatched) go down through the egg to collect the key, and then up and left through the safe which was transformed into a diamond when you had collected the key.

## Area g

Many players have asked how to lure the spirit at the centre of area g into one of the cages. Indeed, one customer swore blind that *Repton 2* had a bug in the game because this one was impossible to complete. When we explained the following technique to him he checked it out and then phoned us back apologising profusely.

To stop the spirit from moving endlessly in a circle, it is necessary to move the rock from position B to position A in figure 4. Starting from position A, follow the arrows but leave the diamonds alone. Now push rock B to the right. Follow the rock down and push it again to the right to position A.

Also on area g, the top left-hand corner should be left until last. Collect diamond C and wait here until the remaining spirit

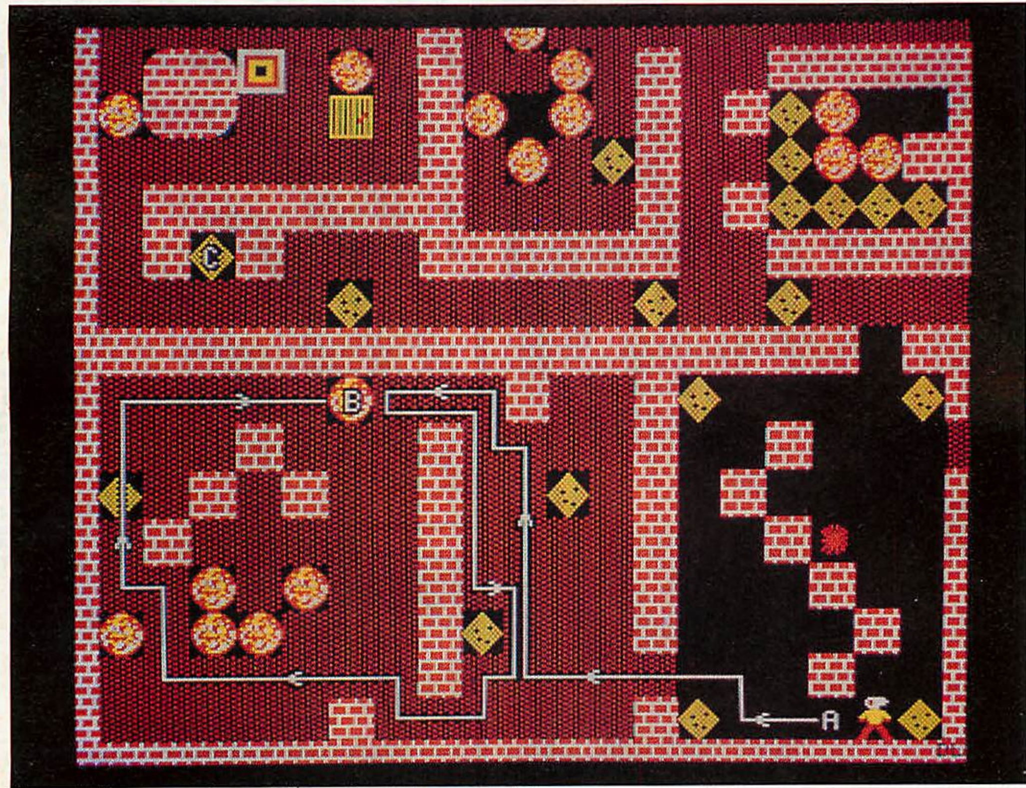
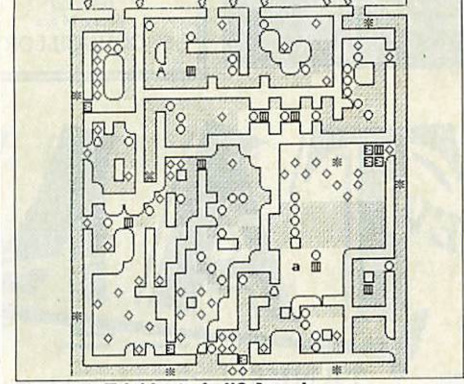


Figure 4. Area g needs careful use of rocks to catch spirits

passes below you to the left. Now follow it into the top section dislodging the rock, which will prevent the spirit escaping from this section, and guide it into the cage by moving the other rock.

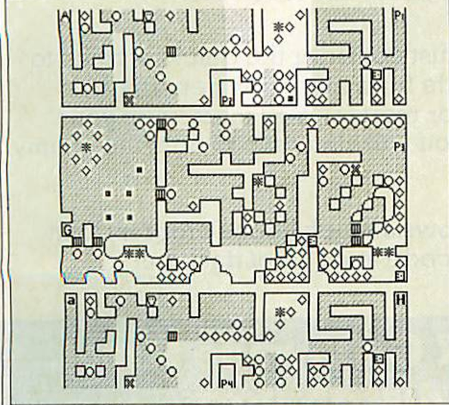
## Area i

This is probably the trickiest! You start near the top at position a, and there are 8 spirits on your trail (figure 5). Only 7 are shown because one starts at the top of the screen among the meteors. Timing your movements and careful planning of routes are vital here.


Figure 5. Trickiest of all? Area i

## Area p

This is a bewildering area which gives the player a sense of deja-vu (figure 6a). You start at position A in the top left-hand corner. To collect the earth, diamonds and puzzle-piece from the highlighted block, you must collect diamonds C and E, then push rock B to position C and rock D to position G (figure 6b). Now collect the earth-piece F. As you move out, the rocks will fall allowing you to pick up the remaining diamond and puzzle-piece. Now take transporter p1 followed by transporter p2. Work your way through the centre section starting at the left in position G. Take transporter p3 followed by transporter p4. You will now be at position H and must go the reverse way through a section very similar to the top section of the area. This is in fact the third section of this type that you will have come across because there is a similar one on area j.


Figure 6a. Map of area p

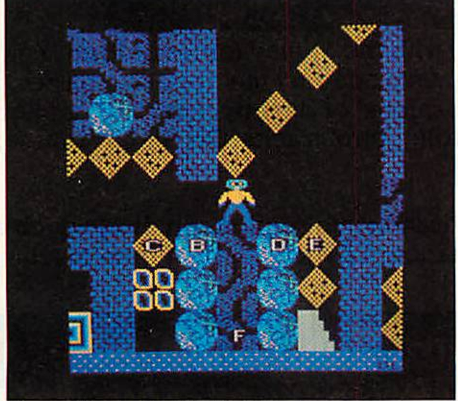
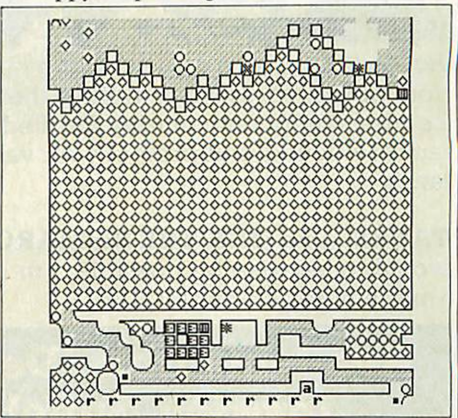


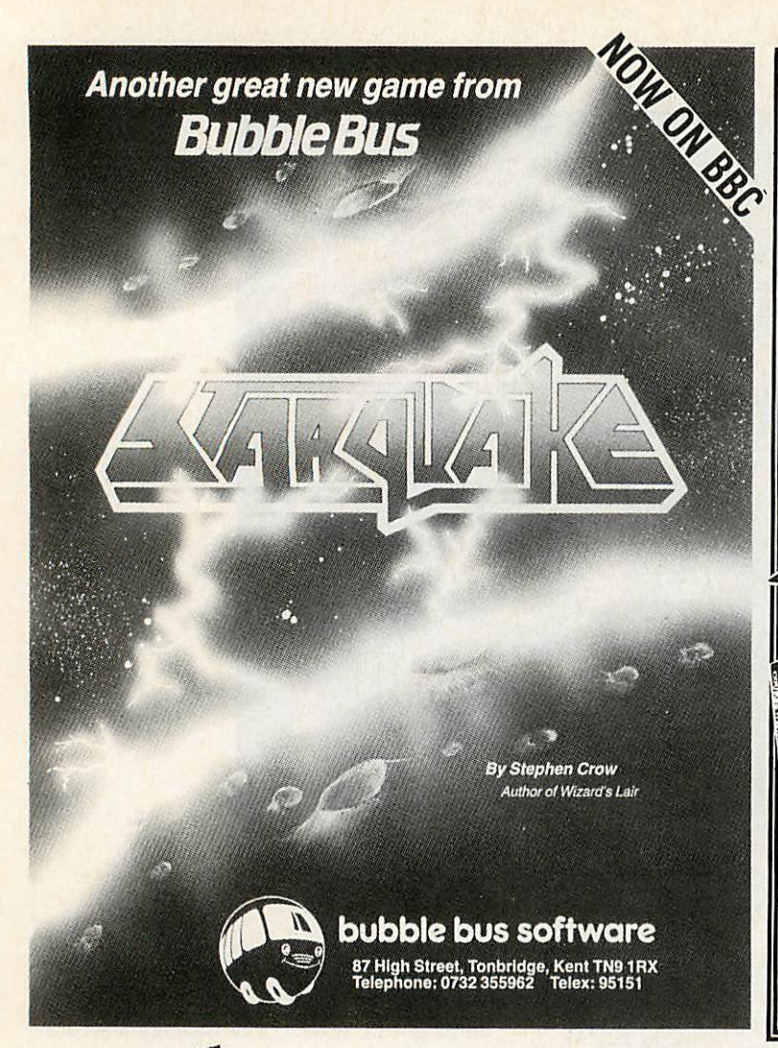
Figure 6b. The highlighted block

## Area r

A rewarding area which is reached via areas g and q. On our suggested route this will be the final area you encounter before returning to area a for the last time and completing the game. Area r is rich in diamonds but you'll feel you deserve it by now (figure 7). To the bottom of this area, you must use the 11 transporters labelled r before the one labelled a. This transporter takes you back to area a to collect the final puzzle-pieces and assemble the completed jigsaw puzzle at the bottom.

Happy Reptoning!


Figure 7. Area r at last




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FOR BBC B with DISK

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The game simulates a Second World War tank battle. You choose from three scenarios: Western Europe 1944. North Africa 1942 or Russia Winter 1943. Then you may choose you forces. **TANKS!** is one player, and you play against the computer.

Action takes place on a scrolling map, with the enemy forces hidden. You must consider the quickest route to your objective, avoid or defuse the mines placed by the opposing forces, hide from marauding enemy bombers, negotiate enemy fortified positions, or destroy them with artillery or mortars. You must keep your tanks refuelled, but protect your valuable petrol trucks. Oh, and of course, you will also have to fight the enemy tanks.

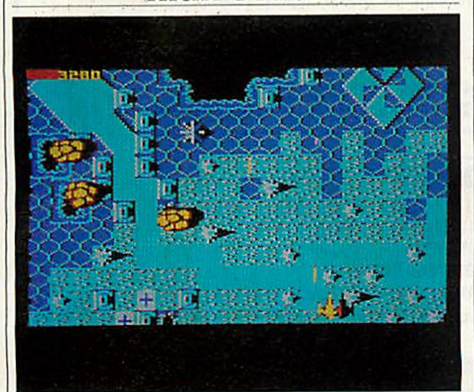
**TANKS!**, like **SINK THE BISMARCK** is split into sections on disc, which allows a much larger program than would otherwise be possible. For instance, TANKS! is 14K of pure machine code and 18K of data, but runs in hi-res colour MODEs.

**Available from: Design People Software, 77 Grimwade Street, Ipswich, Suffolk IP4 1LN, or from good distributors.**

# REVIEWS

## GAMES

### LOW INNOVATION, HIGH STYLE



**Firetrack; Electric Dreams; BBC B/B+/ Master; cassette £9.99, disc £14.99**

This game has thrown most of the *Acorn User* office into raptures. People take one look and say, 'It's about time.'

There's nothing particularly new or innovative about it – it's simply a classic of its genre, an arcade shoot 'em up in the grand style.

As usual, the plot is largely dispensable. All you really need to know is there are several worlds to fly across, each with fortifications to destroy, heavily defended by cunning enemy spacecraft.

The strength of the game is that it's colourful and fast. There's no time for strategy; it's unmitigated mayhem from start to finish.

There is a choice of three worlds to start from, the main difference between them being different colours and the fact that on Ice World your attack is unopposed for a while. I always start there.

When you zap a ground feature it blows a hole right through the surface of the planet, through which you can see slowly moving stars. The landscape is detailed and colourful. The explosions are dramatic. And I can't tell you what happens when you make it through to the end of a run because I've never survived that long.

The game has a couple of nice touches. The sound effects and music can be switched on and off separately, and there is a black-and-white option which does something clever with clock timings and gives marginally smoother scrolling, though personally I'd rather stick with the colour.

But there are also some raw edges. The information screens at the beginning of a run are a little tacky and difficult to read, and the row of crosses which carves up the screen when you get a bonus is similarly untidy. But the graphics during the game are faultless.

If you think I'm in love with *Firetrack*, you're right. I haven't seen a better zap game for the BBC micro.

**Steve Mansfield**

### LET THE MACHINE DO THE WORK

**Brian Clough's Football Fortunes; CDS; BBC micro; cassette £14.95, disc £17.95**

A completely original idea in computer games, *Brian Clough's Football Fortunes* is a board game in which the computer plays an active part.

The pack contains game board, player cards, counters, and a 40/80-track disc. To play, you will need up to four friends.

The computer allocates footballers to the players who then take the appropriate cards out of the pack. On each card is a footballer's name, his position, and his Brian Clough star rating. I was very disappointed that Terry Gibson, once of Coventry City fame, only had a rating of one. But the man 'imself knows best. Each player then chooses a team. The names don't matter: Canterbury United could win the UEFA Cup.

The game is menu driven. The computer shakes the dice and you're off. Around the board you go: each square has its own consequence, which can be good or bad. For example, a sponsorship square means that you collect a suitably large sum of money, but if you should land on a wages square it means giving some back to the bank. Other squares are manager's luck, equally good or bad; selection problems which are invariably bad; and Sunday, where nothing happens.

After the first season, you have the option to carry on. If you decide you've had enough, the computer works out who has won: this is not just money, but how successful you have been through the whole season.

Overall, *Brian Clough's Football Fortunes* is a game that is fun to play, with clear instructions, in a smart box. It leaves the fun bits to you and does the tedious bits itself.

**Richard Bellis**

### SIMPLE BUT LIKEABLE ADVENTURE

**Winter Wonderland; Incentive; BBC micro; cassette £7.95**

*Winter - Wonderland* is one of the first adventures to be released under the Medallion Graphics Adenture label and was written with the *Graphic Adventure Creator*.

You are an anthropologist and hear of a civilisation in Tibet which has developed at the same speed as our own but totally independent of it. Naturally, you set off for Tibet.

The site of the discovery is on the lower slopes of the Himalayas and can be reached by a light aircraft. You hire a run-down Cessna and set off. Unfortunately, a freak snowstorm causes the aircraft to be taken higher and higher into the mountains. The engine, unable to cope with the high altitude, gives up. As the plane crashes, you think you see a glint of glass. Could it be the civilisation? You've no time to think about it.

The adventure starts with you next to the wreckage of the aircraft in the middle of a large snowfield. You have to find some way to keep warm as the temperature is far below freezing. Luckily enough, on the ground next to you is a fur coat! No problem. Wandering around, you find a flare gun and after only a few moves you come across the only exit from the snow field (apart from dying). By coincidence there happens to be a bear blocking your way. Fire the gun and the bear makes a dash for it in the other direction. The rest I'll leave you to discover.

The problems facing the adventurer were, I felt, more for the person who only plays adventures occasionally and is not too experienced. For the experienced adventurer, the scenario was on the small side and the problems a little too easy, bar one or two. The adventure also uses graphics for about half the locations which are drawn rapidly and are reasonably entertaining. One point I found not to my taste was that on moving to each location the screen is cleared, deleting all the information from the previous location. This is a pet hate of mine, but should not deter anyone from purchasing a very good and enjoyable adventure.

**Chris Hunt**

# BOOKS

## IMAGINATIVE INTRODUCTION




**Program and Electronic Projects for the BBC, Electron and Spectrum Computers; Graham Bishop; Macmillan; £8.95**

Not exactly a hardware projects book, not exactly a programming guide, this is a very valiant attempt but with distinct signs of being a rush job. The author has tried to combine an introduction to both Z80 and 6502, to Basic, assembler and machine code, utilities and general procedures, and elementary hardware interfacing, all in just over 160 pages. The result is rather like the curate's egg: good in parts.

The listings are straight dumps throughout, and many (particularly the Spectrum) are almost unreadable, due either to bad layout or bad reproduction or both. Seeing that more than half the book is devoted to listings, I think that more care could have been taken. The problem is supposed to be covered by an accompanying cassette.

The hardware section is scrappy and leaves many important details unexplained. There are also some naughty implementations which could educate the beginner into bad habits; things like unregulated reference voltages on A/D and D/A converters, and no information on calibration procedures (or the need for them!).

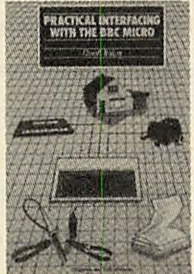
The author is fairly obviously more at home with the Spectrum than the Acorn micros, and there is a good appendix of Spectrum-only school physics routines (why not BBC as well?), but there is no excuse for annoying inconsistencies like Z80 ops in numerical order only and 6502 ops in alpha order only.

On the positive side, this is one of the few projects books which carries adequate warnings about messing about with the mains electricity supply. I suspect that Mr Bishop is one of the few teachers who likes kids. The software routines are imaginative, too, including such things as graphic plots of magnetic fields and optical ray diagrams as well as simple data processing such as sort and text justify.

On the whole, it's a bit pricey at £8.95, but not to be ignored by the beginner as a backup to other material.

**Mike Barwise**

## HAIR RAISING INTERFACING




**Practical Interfacing with the BBC Micro; Geoff Bains; Chapman and Hall; £7.95**

This is yet another BBC user port interfacing manual. Programming the user port VIA chip is well explained, including information for the Master. The hardware designs follow for an LED output monitor and switch input unit, which are both well laid out on Veroboard, and control programs are provided.

There is a brief introduction to transistor driving, although the explanations are insufficient to allow intelligent user implementation – you just copy the drawing. This is not very helpful – an explanation of principles is essential if books like these are going to serve any real purpose.

The author then goes on to describe a mains control unit built on Veroboard. Apart from my usual reservations about connecting beginners to the mains, the use of Veroboard is downright lethal. It simply can't take that much power.

Supposing the reader has survived this chapter, the projects that follow are quite interesting. Information is provided on sensor interfacing, albeit on a crude level in some cases. A notable example is the use of light dependent resistors. Both the simpler and the 'improved' versions could suffer from serious stability problems that the author has not seen fit to mention, and although analogue output is covered to moderate precision, no attempt has been made to sense analogue inputs except in the simplest 'go/no go' terms.

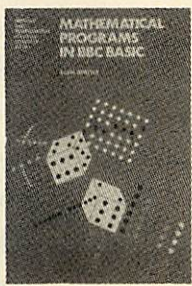
The inevitable buggy 'robot' has some quite nice touches. Not least is a perfectly feasible dark line follower using four sensors: much better than the usual two.

The book is generally well presented, but the computer graphics throughout would have been much clearer had they been conventional artwork.

**Mike Barwise**

## MATHEMATICIANS' COMPUTER BOOK

**Mathematical Programs in BBC Basic; Alan Whittle; Prentice Hall; £7.95**




This turns out to be quite a valuable handbook of mathematics solutions for problem solving and demonstration. The range of functions covered is quite wide, from histogram plots through trigonometry to integration and polynomials.

A familiarity with the concepts, techniques and conventional mathematical symbols involved is assumed, as this is not a mathematics textbook, but a mathematicians' computer book.

I have not tried out many of the examples (some of the maths is beyond me!), but the presentation is superb: well laid out, with clearly printed listings, line-by-line notes and comment headers.

Each chapter covers a specific type of mathematical problem, with exercises.

A brilliant touch is that all the listings – with one exception, and modifications for that are given – run equally well on the Electron without modification. I reckon that's quite an achievement at the advanced level of these programs.

This book is one of the best in terms of value for money that I have yet seen. Possibly my only gripe is the binding, of the 'perfect' type, which may not last too long when it's used as a reference book, as it won't open flat.

An excellent and highly recommended textbook for school maths at upper secondary levels and beyond, this is also a programming reference book for physicists and statisticians.

**Mike Barwise**

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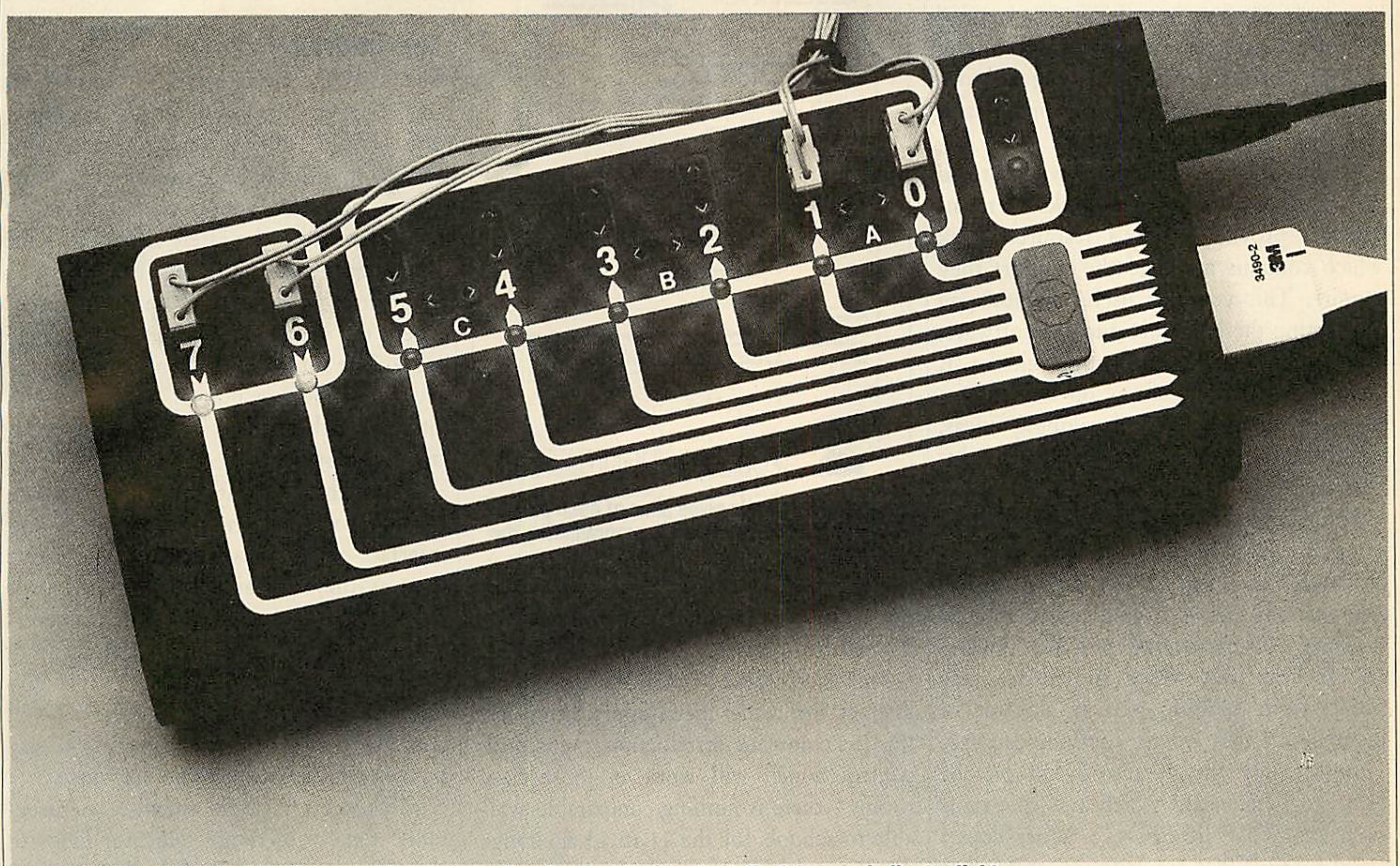
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## REVIEWS

### HARDWARE

# CONTROL GETS A LEG-UP

**With Lego often used to build models for computer control, Peter Avis looks at its educational materials and interface**




**Lego interface, with the eight lines used in programming: two input, six output. Each has an indicator light**

MAIN PHOTOGRAPH BY JAMES JOHNSON

Enthusiasts in the field of computer control, where the computer is used to switch on and off devices such as motors and lights and to detect signals from sensors like micro-switches and light detectors, have long used Lego to construct the models which are controlled. Good examples are small Lego vehicles or buggies, lifting barriers or simple robot arms all controlled by the computer. To do this they have used a variety of interface boxes, computer programs or languages. So it seems natural that Lego should produce a set of complementary packs which provide a complete introduction to control by computer. They have been produced in collaboration with British Schools Technology and the now-disbanded Microelectronics Education Programme (MEP).

Lego has developed four new packages: a teaching materials set called Programmable Systems, a computer interface, and two kits of Lego for making up models.

## Programmable Systems

The written materials in this package are specifically designed for schools and have a distinctive problem solving philosophy. The wallet contains: a teachers handbook; 10 resource booklets for pupils; assignment cards; a master program sheet; a master assessment sheet; keystrips and two discs

**Figure 1. Screen shows the language, with a program entered. On the left are commands and on the right the condition of each input and output line**

of software. Although they are aimed initially at those in the 11-14 age range, it is suggested the materials could be used for courses in technology, computer studies, control technology, integrated studies and general studies.

The obvious comparison to the Lego material is the Microelectronics For All kit (MFA), produced by Salford University and MEP and marketed by Unilab. Both kits contain high quality teaching materials and aim to provide all the resources required for the course. They both aim to provide pupil materials which free the teacher to act as a manager rather than a lecturer. Both have an overall 'systems' approach running through them.

Despite the similarities these are complementary courses rather than competitors. The Lego materials place a greater emphasis on the different aspects of problem solving and the programmable nature of the computer rather than the input-

process-output style of the MFA course.

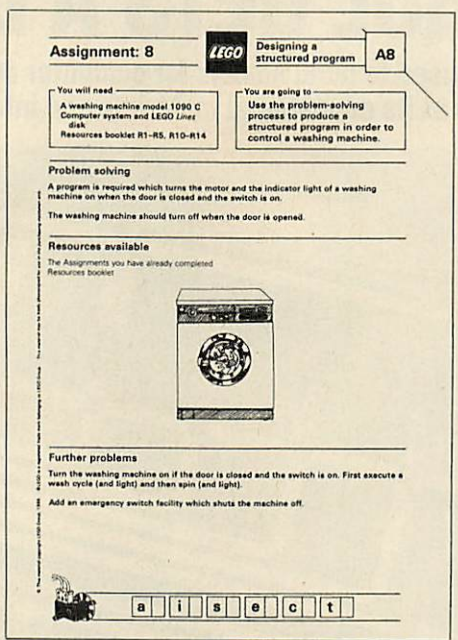
The course follows the pattern: introduction to the materials; introduction to programmable systems; introduction to computer control; introduction to manual control; sensing and feedback; computer control; manual control; solving a problem; designing a structured program and designing programmed systems.

Organisational aspects are well catered for; the pupils tackle their tasks in teams and are provided with a resource book which contains much of the support they require. This contains useful sections on connecting the hardware and the software, writing programs and designing vehicles. It also contains five sections on analysing a problem, finding and developing ideas, producing a solution, evaluating the solution and then communicating it.

BST's and MEP's writing teams have done an effective job on the content, although I have one or two minor worries that it may misfire with inexperienced teachers. For instance, the resource book is an excellent idea which should free the pupils from learning a large amount of detail before they can do anything exciting. Unfortunately this is introduced on the first assignment card which asks questions such as: 'What are SFDs?'; 'What does i stand for?'; 'What are criteria?' and 'c has five elements in it. Which do you think will be most difficult for you to achieve?' (SFDs are structured flow diagrams, i stands for ideas, criteria are a list of statements describing what is required of the solution, c stands for communication.)

I am not sure that asking pupils questions on the jargon of problem solving is the best way to convince them of the usefulness of the resource book! It is important that teachers adopting the course work through the practicals and become familiar with the overall philosophy.

Similarly, some teachers and pupils may misunderstand the heavy use of the mnemonic aisect (standing for analysis, ideas, solution, evaluate, communicate and teamwork) in the material. These ideas need to be introduced as the pupils get some experience of practical problem solving, rather than as a theoretical idea. Once again the teacher must make sure they follow the philosophy of the course rather than use it only as a set of workcards. I am not sure that problem solving can be learned by rote!


Assignment: 8

LEGO

Designing a structured program

A8

You will need
A washing machine model 1090 C
Computer system and LEGO *Lines* disk
Resources booklet R1–R5, R10–R14

You are going to
Use the problem-solving process to produce a structured program in order to control a washing machine.

Problem solving

A program is required which turns the motor and the indicator light of a washing machine on when the door is closed and the switch is on.

The washing machine should turn off when the door is opened.

Resources available

The Assignments you have already completed
Resources booklet

Further problems

Turn the washing machine on if the door is closed and the switch is on. First execute a wash cycle (and light) and then spin (and light).

Add an emergency switch facility which shuts the machine off.

a i s e c t

**Workcard for pupils gives aims of each project and problems to be solved in programming the control system**

However, these comments should not distract the reader from appreciating that this is a complete introduction to computer control which will work in most classrooms – there is nothing comparable available to schools for the 11 to 13 age range. As the valuable teacher's book stresses: 'The materials as a whole should be regarded as a flexible resource.'

As such it is an extremely valuable contribution to technology education.

The software provided consists of a control language called Lego Lines and a number of sample programs. Hence the user can program what output lines he or she wants on or off at each step or can control the timing and use programming structures such as:

REPEAT...UNTIL
REPEAT...ENDREPEAT
IF...ENDIF
REPEAT...FOREVER
COUNT

The decisions for these commands can be programmed to depend on the state of the input lines.

As it is running the program shows the state of the output and input lines and highlights the part of the program in operation. Figure 1 shows a simple program to control a washing machine. The software also has the usual facilities for saving, printing and loading programs. There is also a set of Basic procedures that achieve the same kind of control facilities.

## The interface

The interface is designed to convert the small signals produced by the computer into usable voltages and currents that switch on and off Lego motors, lights and so on, and also allows signals from the outside world to be safely taken in by the computer. It has six output lines and two input lines, each of which ends in a socket where the user can plug the normal Lego cable. The interface is mains powered and plugs into the user port of the BBC micro, although other cables could adapt it for other computers.

Although specifically designed for controlling 4-volt Lego motors and lamps, the interface could be used for other devices as long as they use approximately the same current and voltage. It can control motors either by switching them on and off from one line or using two adjacent lines to give forward and reverse. There is also a 4-volt constant output and a useful manual stop button which halts all the six outputs: a sensible safety measure when testing programs! Finally there are indicator lights to show the state of each of the lines.

The two input lines work so that the computer measures a 0 if there is no connection made and a 1 if there is one. So the computer could tell if a switch had been closed or whether or not the specially designed Lego optosensor is 'seeing' lights. In case it is ever connected back to front, the interface has optical isolation to protect the computer. It is designed robustly and should be a useful addition to the various interfaces that exist already.

## Lego kits

Lego 1090 Technic TC-1 is a specially designed set of components for making computer controlled models, and there are enough bits and pieces for a great variety of designs.

Instructions are provided for a washing machine, sliding doors, a buggy, a fairground wheel, two conveyor belts, and a simple robot arm.

Of special interest are the two motors and the two optosensors. The motors come

ILLUSTRATION BY SOPHIE GRILLET/PHOTOGRAPH BY JAMES JOHNSON



**Washing machine has optosensors for door position; on/off switch; motor; indicator lights. Each is on a control line**

with enough gears, pulleys and wheels to create as many designs as pupils are likely to dream up.

Like Lego Technics kits, the models take some time to build (up to an hour or more) and this will cause timetabling problems. Unless schools can set aside whole mornings it becomes impossible to complete the later major assignments in one lesson. This means that schools cannot use the kits with more than one class at a time without having to dismantle pupils' work.

The optosensors are a new and welcome addition to Lego. They detect the presence of light but can also be used to differentiate between white and black surfaces. Useful discs with black and white segments are provided; used with the sensors they allow the computer to calculate an amount of rotation. Similarly the sensors switch when a white surface or a yellow Lego brick is close, so a buggy can be designed which steers around objects or even follows a yellow brick road!

This is a fairly expensive kit and I am not sure that the complexity of it fits into the aims of the course. Enterprising teachers may well find that they could use a cheaper mixture of this and other Lego kits to advantage. There is an even larger kit, Lego 1092 Technic TC-2. Both kits can be driven by Lego's existing manual controller as well as the interface.

## Lego in the classroom

My experience in using Lego in the classroom is that even pupils up to the age of 16 accept it as a design medium and do not see it as too childish. Certainly for this age range, 11 to 13, this material should give a good understanding of computer control and of building working models.

I believe that many schools and LEAs will benefit from this material although some might find it useful to adopt a 'cut and paste' philosophy and mix the Lego materials with their existing approaches to computer control. For instance the Lego interface and kits could work as well with Control Logo, Control-It, Control Basic, etc, or equally the software and educational materials could be used with other interfaces and equipment.

One of the difficulties will be the cost. The recommended class set is: 10 Lego 1090 sets at £75, 10 Manual Controllers at £27, five Lego Interfaces 1093 at £90 and one Programmable Systems Wallet at £50 (plus access to five computers), giving a total of £1520.

This is a considerable amount of money for a non-examination course for first to third years for perhaps 15 to 20 double periods. Of course it can be extended beyond there: the hardware can be applied to other subjects including GCSE Computer Studies and CDT-Technology, although the course materials will not be completely suitable for these.

This set will help many schools introduce control to pupils in the first three years of secondary school. Its main drawback, like MFA, is the expense for a class set, but I hope that schools, LEAs and central goverment will see its importance and find the resources.

*Programmable Systems, Lego number 1455, typical price £50 but also counts under the DTI software scheme. The interface unit, Lego number 1093, price £90. Lego Technic TC-1 Universal Models for Computer Control, Lego number 1090, price £75. Lego Technic TC-2, Lego number 1092, price £90. Manual controller, Lego number 1039, price £27. Available from large education suppliers (eg, Arnolds, Griffin and George, Phillip Harris).*




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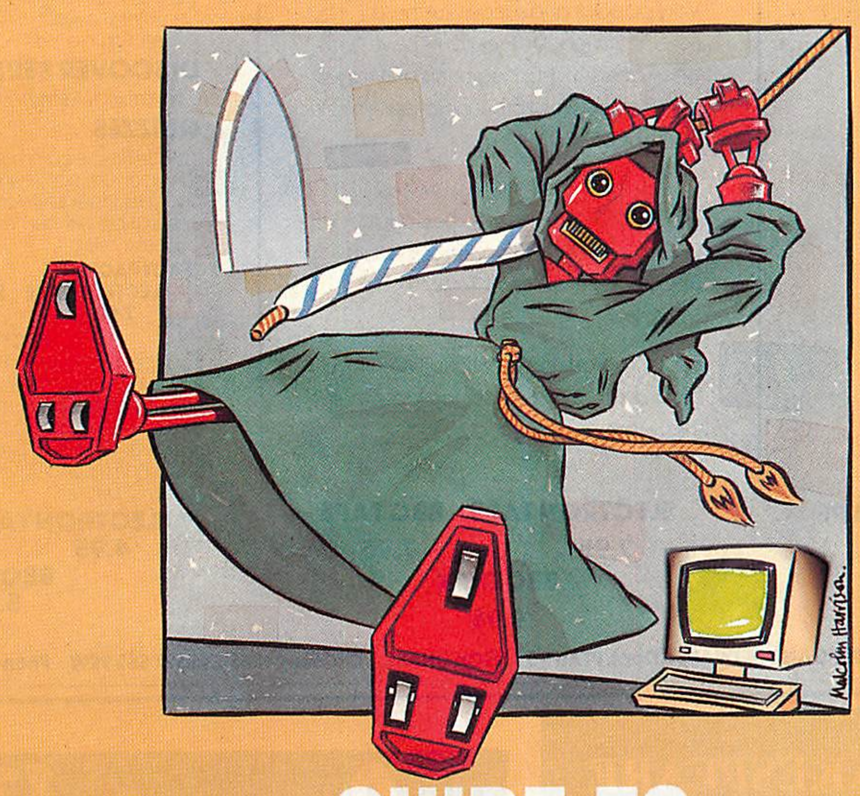
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ILLUSTRATION BY MALCOLM HARRISON

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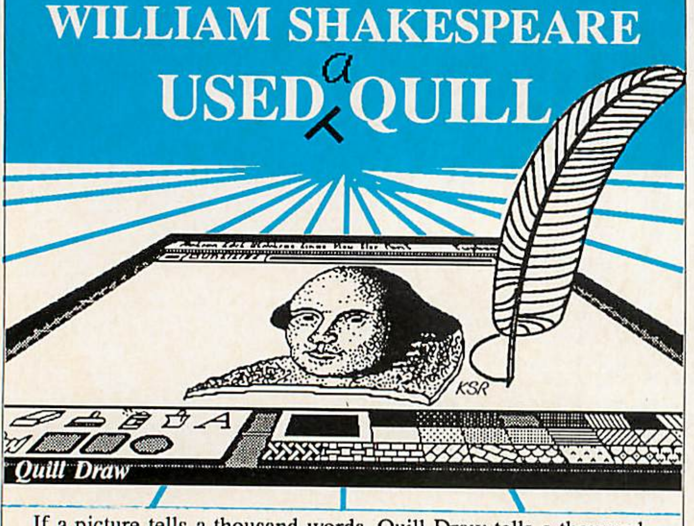
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# EDUCATION

## NEWS




## It's easy to say no

*Smack* is a package which aims to address drug abuse problems among adolescents. It was produced by Daco Software in conjunction with Drugline in Birmingham. All royalties go to the organisation.

*Smack* is not an adventure game. It presents stark facts.

The packaging explains: 'For anyone who is tempted towards experimentation it will provide a chilling recreation of the likely outcomes.'

The program is down-to-earth, ensuring the user takes the issues seriously. It deals not only with addiction but the problems of raising money, theft and the difficulties in personal and sexual relations which arise from saying 'yes'.

This package has already received plaudits from a number of institutions, and Daco is looking at tackling the subject of Aids. Input from readers and users would be welcomed.

*Smack* comes on three discs with comprehensive documentation. It costs £18.50 (plus VAT) from Daco, 59 Mackenzie Road, Birmingham.

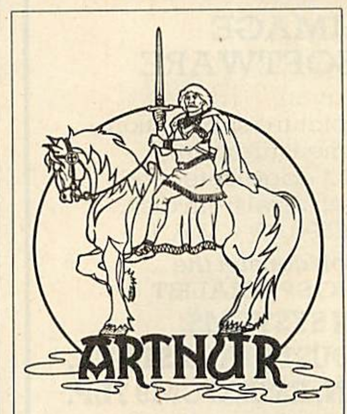
## Search for Camelot

Chalksoft has released the first of a series of multi-media packages aimed at the junior and middle age ranges. *Arthur* is a graphics adventure with story tape, 20 slides, tape commentary and project work books.

The package is accompanied by teacher's notes which expand upon the theme and help even the most timid novice get to grips with the ideas.

*Arthur* is a departure for Chalksoft in that it has previously concentrated on a variety of one-off packages on a wide range of subjects. But this beautifully presented theme pack will attract a great deal of attention with its excellent slides and tapes.

The package is published by Nene Valley Publishing – an off-shoot of Chalksoft set up for this venture. Also involved are Rickitt Educational Media, known to many teachers for its bulk purchase software schemes, and its holding company, The Slide Centre. Hence there are high quality slides from Rickitt.




**The Arthurian legend explored**

Chalksoft has been careful to make the story of King Arthur palatable for juniors. A spokesman for the company said: 'We don't want Mary Whitehouse on our backs so have been selective about which bits of the Arthurian legend we included in the package.'

Multi-media packs present a viable means of putting software into schools. Companies like Cambridgeshire Software House, 4mation and Ginn have been producing this type of pack for some time.

Chalksoft looks to be leading a move towards curriculum integration of the computer which will take place in educational software houses as the DTI money declines. Packs which present a complete theme are likely to be more palatable, more relevant and more likely to be used than the once-a-year items which predominated from most software houses until recently.

*Arthur* costs £29.95 (plus VAT) and £31.95 for a Master Compact 3.5 inch disc version. Chalksoft, PO Box 49, Spalding, PE11 1NZ.

## Adventures from Pendown words

The *Pendown Adventure Writer* allows users of the *Pendown* wordprocessor to convert their own stories into a text adventure. The package works simply by providing a format in which routes out of and into pages are linked with various specified conditions.

The writer may define a 'page' of any length, since the end-user will be able to scroll up and down the page. Included with that page will be instructions which control the conditions of entry to and departure from the page. Moreover, this 'program' of instructions will allow responses to the user's responses and actions. The programming itself is very simple and, as one would expect of Logotron, very Logo-like. The package is not sensitive to whether text is entered in small or capital letters – or a mixture.

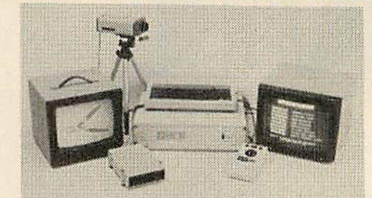
Assembly of the adventure is straightforward and it may be disassembled at any time for editing or extension.

The package comes complete with a Sheerluck Holmes adventure in which he is aided by Charlie Watts (Dr Watts' son), of all of which gives some idea of the sense of humour of the adventure's author, Tony Stainer, who is deputy head of a Middlesex school.

With thousands of copies of *Pendown* in use in primary schools nationwide, this and future extensions seem assured of a ready market.

*Adventure Writer* comes from Logotron, Dales Brewery, Gwydir Street, Cambridge.

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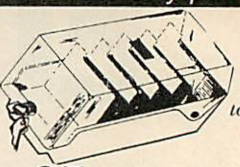
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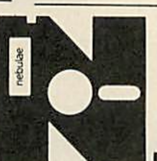
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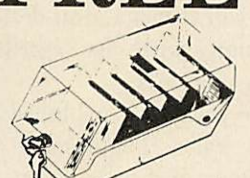


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## Linked up for languages

CLASS (Cambridge Language Arts Software Services) produces software relating to the needs of the language and literature classroom across the age ranges.

The *Class Write* and *Class Reader* packages allow text and graphics to be presented in linked pages which may form teletext format message boards, branching stories and so on.

Although not new in itself, the concept of the teletext editor has been taken somewhat further in that CLASS has provided a substantial amount of material which is used by the *Reader* package. In addition, texts produced using *Write* may be integrated into the other packages in the company's range, such as *Textbase, Clozed Book, Stop That* and *Enigma.*

Reflecting the considerable interest the software has generated, it is now being marketed by Cambridge University Press as part of the Primary Language Project. CLASS is at 2 Howard Court, Howard Road, Cambridge CB5 8RB

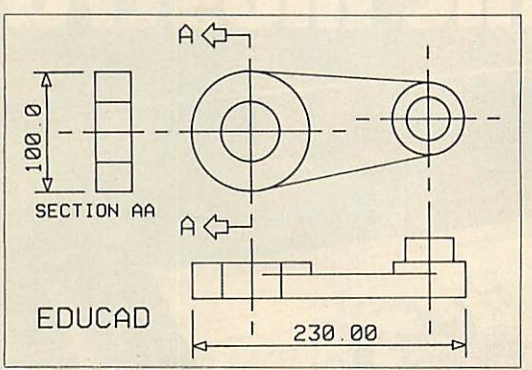
## Don't get lost

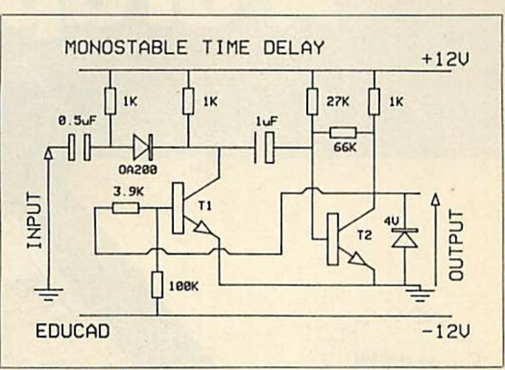
Cunning Running Software now has a BBC version of its program *The Forest*, designed to develop the skills of orienteering.

Reading contours on the colour maps provided, interpreting the lie of the land and attempting to stay within the time limit provide challenging education.

Using several clever techniques of display, the user finds his or her way through the largely featureless forest. An option is to switch to a more complex terrain.

*The Forest* is available from Cunning Running Software, 11 Avon Buildings. Flower Lane, Amesbury, Salisbury SP4 7HF and costs £15 per copy. A network version is also available.




**Mechanical and electrical design blueprints produced using *Educad* software**

# Design gets practical

*Educad* and *Educnc* from Edusoft offer users a simple and effective means to introduce computer-aided design (CAD) and computer numerical control (CNC) into the curriculum.

The company thinks CAD systems should be user-friendly and has designed the software with this in mind. The packages have explanatory prompts and clear error messages, and extensive help is available by pressing the Escape key.

*Educad* is modelled on industrial CAD systems and has been designed to cope with practical situations. Thus it is possible for the user to configure the data streams being sent to drive plotters and printers. Moreover, in the numerical control package, this flexibility means that actual work may be undertaken, making it attractive to industry and businesses. One user is reported to have configured a system to drive a CNC machine over the telephone line.

Edusoft believes many CAD packages, especially those in education, are 'Mickey Mouse' attempts, to quote director Lynda Green. Although they appear to perform the operations needed by such a system, the methods of use tend to be complex and inaccurate. Using a BBC micro allows the user a tolerance of up to 1/1000th of a millimetre in design. The *Educad* package maximises that potential and provides a no frills method of CAD.

The package is likely to be of interest to all ages studying design, whether at home or in school. The library of symbols and shapes can be built up to be the source of rapid design by the integration of pre-prepared elements. *Educad* may be driven from keyboard or joystick.

*Educad* costs £92 for a stand-alone version and £287 for an Econet version. *Educnc* costs £40.25 for stand-alone and £126.50 for Econet. Edusoft, Lodge Hill, Sevens Road, Cannock Wood, Ruggley, Staffs WS15 4RX.

# File eases choice of software

To keep track of the 2500 available packages relevant to education, Nick Evans has released The Datafile of Educational Software, a section of which is published in this month's *Acorn User*, on pages 159 to 164.

Each record in the Datafile holds the title, publisher, price, machine, age range and subject area of the piece of software.

To make the disc based file easy to use, the information is indexed by title, publisher and subject, and is supplied with a report file. Users can also add their own indexes. Also supplied in the Datafile package is a second disc containing a file of over 700 addresses of suppliers and organisations.

The discs are in *ViewStore* format, but other databases can make use of the Datafile as *ViewStore* holds data as a simple ASCII file format with records separated by Return &0D and fields by Tab &09.

The datafile can be ordered using the form on the right, returning it to Nick Evans, PO Box 55, Grimsby DN32 0QB. Please allow up to 30 days for delivery of the Datafile.

**The Datafile of Educational Software**

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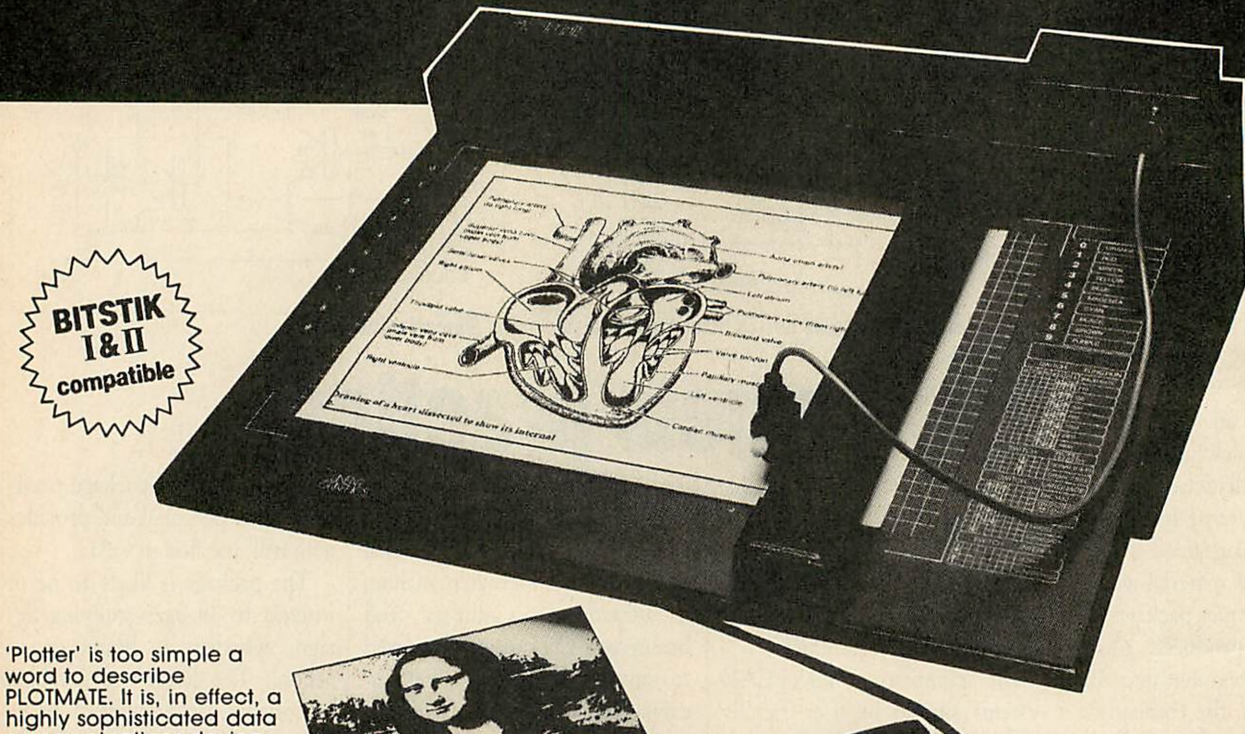
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# PLOTMATE

# A Graphic Illustration




'Plotter' is too simple a word to describe PLOTMATE. It is, in effect, a highly sophisticated data communications device that greatly extends a micro system's options and capabilities allowing high resolution input and high definition output. It is compatible with all leading micros including the BBC, IBM, AMSTRAD, ATARI and NIMBUS.

**PLOTMATE A3M with Linear Graphics' high resolution image scanner — LINSCAN.**

**NEW RELEASES**

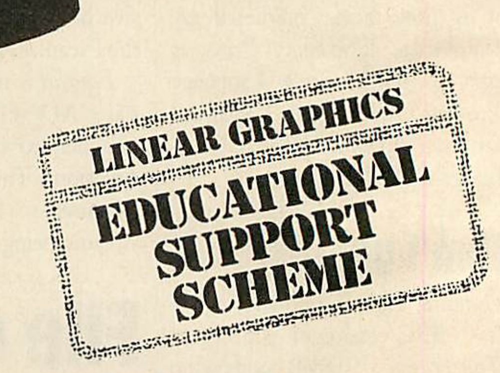
**HPGL** — By expanding the on-board graphics language range PLOTMATE understands commands from HPGL 7475A/7470A industry standard languages enabling compatibility with BITSTICK, AUTOCAD, LOTUS 123, SUPERCALC 3, CHARTMASTER and many others.

**IMAGE SCANNING** — PLOTMATE's flexibility is further extended by the use of Linear Graphics' own scanner, LINSCAN. This allows PLOTMATE to function as a sophisticated image scanner producing high resolution pictures that can be used within desktop publishing packages such as Pagemaker, GEM, Fleet Street Editor and Image.

**EXTENDED GRAPHICS COMMANDS** — The in-built graphics commands of the BBC micro that PLOTMATE understands now encompass the extended graphics commands of the BBC Master such as circle and arc drawing, sector and segment filling, rectangle and parallelogram shading.

**DOMESDAY** — All 'Welcome' disks allow data files produced by the DOMESDAY database to be output in pie, bar and line chart format on the BBC Master.

Not content with providing this wealth of technical capacity Linear Graphics have even introduced a unique discount scheme for primary and secondary schools — the 'Educational Support Scheme.'




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AU5

# HISTORIC DECISIONS

**The first part of a look at software for studying the humanities. This month, history**

***Chris Drage***

Most teachers, although quite able and confident in choosing the right book for a pupil, often experience difficulty when it comes to software, without which computers are useless.

Computer software of the content-free kind – wordprocessors, information handling packages and viewdata – play a vital role in every area of the curriculum, and perhaps no more so than in language development and the humanities. However, although this type of software provides vital support, it is towards 'content-based' software that we turn our attention this month, with specific reference to history, and towards environmental studies and geography in the June *Acorn User*.

Three very popular history topics in the primary school are the Vikings, the Normans and life in the Middle Ages. Not unexpectedly, several companies have produced software to support other resources in these historical periods.




***Cateby Manor*: comes with maps and workcards to teach information handling**

## Social

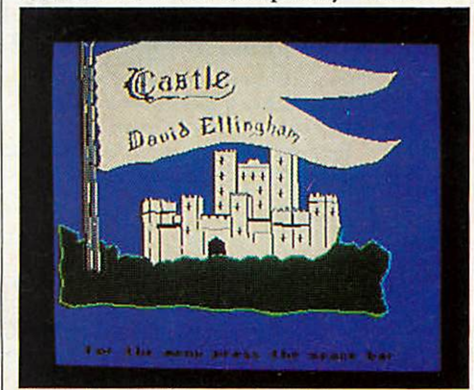
One leading company for simulations is Fernleaf. *Viking England, Fletcher's Castle* and *Norman England* all draw upon a wide range of skills and often cover a number of curriculum areas. *Viking England* with its conditional resource pack provides almost all the materials needed for a study of the Vikings. In *Fletcher's Castle* the children take the role of a Norman knight who must build his motte and bailey castle in 10 days. Decisions must be made regarding the deployment of guards, finding food and finding Saxon workers to build the castle. *Norman England* explores the relationships and problems facing a Saxon village when a Norman baron takes over. Each of these packages offers children a unique glimpse into the social status, responsibilities and experiences of people living in those periods.

## Imaginative

A whole term's work about life in the middle ages can be found in *Castle Pack* and *Cateby Manor* from Resource. The first is a complete package of learning materials about the relationships and activities of people living in a 13th-century castle. A database holding personal details of 67 of the occupants of the fictional castle lies at the heart of the pack. From this, much work regarding people's importance, their tasks and the social structure in the castle can be gleaned. *Cateby Manor* takes this approach even further. It contains different types of data files from which children learn about life on a manor in the year 1086. It aims to develop an understanding of information handling and questioning techniques and to think imaginatively and creatively within a historical context. In this it succeeds admirably. The support materials provided include maps and workcards.

The alternative to choosing a project title and searching for software that fits the way a teacher works, is to select a software package which can become a focus for a project in its own right. Ginn pioneered this approach with their series of Barry Holmes–Ian Whittington simulations: *Mary Rose, Saqqara* and *Adventure Island*. However, many teachers whose children have enjoyed *Expedition to Saqqara* may not be aware that *Archaeology* from Cambridgeshire Software House allows the whole experience to be transferred to another time and place.

The integrated project approach to history studies is well established. Its strength lies in the way artificial subject boundaries are broken down and the fact that the approach emphasises process as well as content. Its multi-disciplinary nature can




***Castle Pack*: built around a database**

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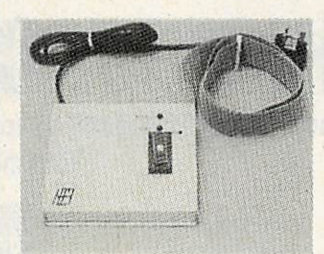
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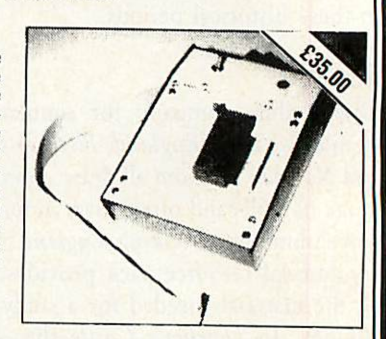
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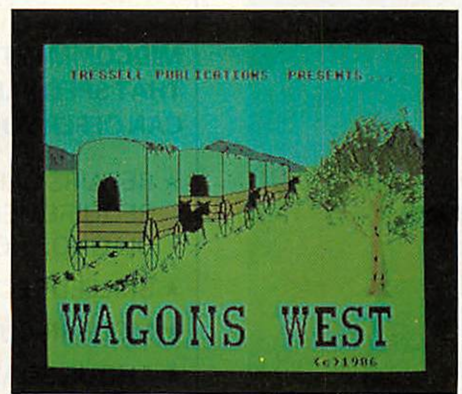
be adapted to flexible forms of organisation which enable children to study individually or in groups. Although often hindered by the shortage of micros in a classroom, good software should reflect this approach.

Over the past two years Tressell Publications has established itself as a producer of simulations upon which full historical topics may be based. Its *Into the Unknown* has been widely heralded as an excellent example of its genre. *Wagons West* surpasses even that. Tressell comprises a number of practising teachers, so it is not surprising that they combine technically well-designed software with a real interest in history. In each of Tressell's packages, the potential for history work is well thought out, with a plethora of supporting information supplied.

*Into the Unknown* starts the children on a voyage of discovery during the 15th century. Before they begin however, there are preparations to be made. The preparations program is accompanied by a number of information sheets, a poster and a map of the known world in the year 1459. The five activities of this section of the program enable each group of children to gain points which are then used in the second, exploration, part. At each stage the children are prompted to read their information sheets to assist them in their decision making. In the exploration section the children have a blank 25 by 33 grid on which they record their findings and events. The main purpose of the exercise is to map the coastline of an unknown land (Africa or South America), and to bring home riches.

*Wagons West* is based on the children adopting a mid-19th-century pioneer family and helping them across the American continent to California. Again, it is preparing for the simulation which provides the firm historical background necessary for the children to become sympathetically aware of the needs and problems of pioneers. Along the route events occur which require group decision making. A great deal of empathy is generated by this package as children become aware that the only means of survival is to compromise with other families (wagons) in the train. The quality of the supporting material is excellent. The motivation and work generated by *Wagons West* is quite incredible, chiefly due to the historical authenticity of Tressell's packages bringing children close to the experiences of the people concerned.

*How We Used To Live* is a very popular history programme produced by Yorkshire Television. Aimed at upper junior/middle and lower secondary schools, the series is supported by a book and computer software. Three periods are covered: 1874 to 1887, 1902 to 1926 and 1936 to 1953. Like the Tressell material, the aim is to provide a range of experiences from which children will gain a sympathetic understanding of how people lived. The award-winning TV programmes are rich in detail and authenticity as well as providing characters with whom the children can identify.



***Wagons West* arouses great interest**

The software has been designed to encourage an interactive use of television and extend the understanding of the social, historical and political background of the periods. The software, typically a suite of three or four programs, investigates and develops a separate theme from the TV series. From the programs teachers can develop their own themes such as travel, fashion, food, laws affecting people, etc. With one or two exceptions, the programs are robust and in one case truly excellent (*Making Ends Meet*, 1902 to 1926). The back-up is well thought out and provides children with maps, photos and charts for recording collected information. The multimedia approach offered by Yorkshire Television provides an extremely promising introduction to how the computer can be used to enhance a TV history series.

## Alive

Each program above, broadly speaking, is a re-creation or reconstruction of events, deliberately simplified to enable particular ideas to be emphasised. Each is historically accurate. However, teachers must be aware of what the software can and cannot do. Computer software, like any other resource, calls for careful preparation and well planned follow-up work.

The use of these programs encourages a great deal of discussion and exchange of ideas which more often than not results in the children learning from each other and not just from the teacher. Each program makes history come alive by developing an interest in cause and consequence and, by so doing, enables the children to arrive at a better understanding.

## Practical suggestions

Try to get familiar with a package, both the software and its supporting materials, long before the children get to grips with it. The project will run more smoothly and many potential difficulties won't arise. This alone justifies the time and trouble taken at this stage to get to know a program.

The topic should be introduced in a measured way. Avoid the compulsion to get the children in front of the micro too quickly. A week or two laying the foundations for the study and building the children's background knowledge will pay handsome dividends once under way.

The importance of the work away from the computer cannot be over stressed. Children are only too willing to research, write, illustrate and model because of the excitement that has been generated.

Finally, become part of the simulation or project. In *Saqqara*, for example, the teacher can take the role of the head of the archaeology department at the British Museum.

***Program** a) Viking England, b) Fletcher's Castle and c) Norman England **Supplier** Fernleaf Educational Software, Fernleaf House, 31 Old Road West, Gravesend, Kent, DA11 0LH **Machine** BBC B/B+/Master **Price** a) £47 plus VAT (cassette and disc), b) £10 plus VAT (cassette) £12 plus VAT (disc) and c) £35 plus VAT (cassette and disc)*

***Program** a) Castle Pack and b) Cateby Manor **Supplier** Resource, Off Exeter Road, Doncaster DN2 4PY **Machine** BBC B/B+/ Master **Price** a) £15.95 (disc) and b) £19.95 (disc)*

***Program** Archaeology **Supplier** Cambridgeshire Software House, Town Hall, St Ives, Huntingdon, Cambridgeshire PE17 4AL **Machine** BBC B/B+/Master/Compact **Price** £14 (Compact £18.50)*

***Program** a) Into The Unknown and b) Wagons West **Supplier** Tressell Publications, Lower Ground Floor, 70 Grand Parade, Brighton, East Sussex BN2 2JA **Machine** BBC B **Price** a) £27 and b) £29.75*

***Program** How We Used To Live a) 1874-1887, b) 1902-1926 and c) 1936-1953 **Supplier** Geoff Foster, Non-Theatrical Programmes, Yorkshire Television Enterprises Ltd, Leeds LS3 1JS **Machine** BBCB/B+/Master **Price** a) £22.95 (disc), b) £34.50 (disc) and c) £34.50 (disc).*

# EDUCATION

# SOFTWARE GUIDE

With an estimated 2800 education software packages available for the BBC micro, finding your way around can be a nightmare. This is a selection based on those packages which can be considered 'software tools'; their content is not fixed and their purpose is to manipulate words, pictures or other data. Addresses are given at the end.

Details of ordering a disc-based software contact list are on page 153.

Any software house which has not been included should contact Nick Evans c/o Education Column, Acorn User, 141-143 Drury Lane, London WC2B 5TF.

Key: Machine BBC B/B+/(M)aster / (C)ompact / (E)lectron / (Ec)onet; School (I)nfant / (J)unior / (S)econdary / (Sp)ecial

| TITLE | PUBLISHER | PRICE | MACHINE | AGE |
|---|---|---|---|---|
| ABC | Acornsoft | £ 9.95 | B | J/S |
| Alpha | AUCBE | £30.00 | B,Ec,M,C | J/S |
| Autotype | JM Leonard | £12.50 | B | Sp |
| BBtype | Furey | £18.00 | B,Ec | J/S |
| Beeline | ESM | £18.40 | B,B+ | J/S |
| Computype | Soft Centre | £18.40 | B,Ec | I/J |
| Easy Type | Sherstan | £12.00 | B,M | J/S |
| Edword ROM | Clwyd Technics | £38.95 | B,M,C | I/J/S |
| Edword+ | Clwyd Technics | £15.00 | B,M,C | J/S |
| Edword 2 ROM | Clwyd Technics | £45.95 | B,M,C | I/J/S |
| Embedded Commands Utility | AVP Computing | £ 9.00 | B | J/S |
| Fleet Street Editor | Mirrorsoft | £39.95 | B,M,C | S |
| Folio | Tedimen | £15.00 | B | I/J |
| Fontwise Plus | Clares | £22.00 | B,M,C | J/S |
| Gamma Word Processor | Polumedia | £10.00 | B | Sp |
| Interword | Computer Concepts | £49.00 | B,M,C | J/S |
| Junior Script | Paean | £12.00 | B,B+,M | J |
| Moving into View | MEDUSA | £ 7.50 | B,B+,M | S |
| My Word | RESOURCE | £ 9.95 | B | S |
| Pendown Tool Box | Logotron | £15.00 | B,M | J/S |
| Pendown | Logotron | £34.00 | B,M | I/S/S |
| Primary Pen | GED | £ 9.95 | B | I/J |
| Printer Driver Generator | Acornsoft | £ 9.95 | B | S |
| Printworks | Logotron | £26.00 | B,M | J/S |
| Prompt 3 | RESOURCE | £ 9.95 | B | Sp/J |
| Prompt 3 (Concept Keyboard) | BIMH | £ 7.00 | B | J/S |
| Quite-Write | Soft Teach | £20.00 | B,B+ | J/S |
| Rustext Printer Drivers | CALL | £10.00 | B,B+,M,Ec | S |
| Rustext80 | CALL | £40.00 | B,B+,M,Ec | S |
| Rusviewnlq | CALL | £20.00 | B,B+,M,Ec | S |
| Simplified Word Processor | Heinemann | £12.00 | B | J/S |
| Space Programme Alpha | CLASS | £28.00 | B,M | J/S |
| Spellcheck 3 | Beebugsoft | £36.00 | B | S |
| Telebook | 4mation | £17.65 | B | S |
| Unitext80 | CALL | £30.00 | B,B+,M,Ec | S |
| View | Acornsoft | £59.80 | B,B+ | S |
| View 3.0 | Acornsoft | £89.70 | B | S |
| View Disc | MEDUSA | £10.00 | B,B+,M | J/S |
| View Printer Driver | MEDUSA | £10.00 | B,B+,M | J/S |
| ViewIndex | Acornsoft | £14.95 | B,M,C | S |
| Viewkey European Languages | CALL | £15.00 | B,B+,M,Ec | S |
| Viewkey Maths and Scientific | CALL | £15.00 | B,B+,M,Ec | S |
| Viewkeynlq | CALL | £20.00 | B,B+,M,Ec | S |
| ViewSpell | Acornsoft | £39.95 | B,M,C | S |
| Vu-type | BBC | £18.40 | B,Ec | S |
| Word Mover | BBC | £ 9.50 | E,Ec | J/S |
| Wordbook | Chalksoft | £17.50 | B,M,C | J |
| Wordpower | Ian Copestake | £32.00 | B,B+,M | S |
| Wordwise+ | Computer Concepts | £49.00 | B | S |
| Write On | Arnold Wheaton | £ 7.95 | B | I/J |
| Write on | SYSTEM | £14.00 | B | I/J |
| DATABASES | | | | |
| Accident | RESOURCE | £ 8.95 | B | J/S |
| Administrator's Friend | Educational Administration | £50.00 | B | Admin |
| Advanced Teletext System | BBC | £ 7.95 | B,B+,M | J/S |
| Airport | Gibsoft | £ 6.75 | B | S |
| Askfax/Getfax | S&S | £16.95 | B | J/S |
| B/Tec Record Keeper | Social Science | £15.00 | B | Teacher |
| BelBase | BelTech | £18.00 | B,B+,E | J/S |
| Beta-Base | Clares | £25.00 | B,M,C | S |
| Billboard | Beebugsoft | £21.00 | B | Teacher |
| BP Energy File | BP Education | £11.95 | B,Ec | S |
| BPES Electronic Catalogue | BP Education | £ 4.75 | B | J/S |
| Bristol Census data | Nelcal | £25.00 | B | S |
| Census and Placenames | RESOURCE | £15.95 | B,M | J/S |
| Census Database | Nelcal | £75.00 | B | S |
| Chemical Database | Longman | £29.95 | B | S |
| Classmaster | Wilson | £19.50 | B | Teacher |
| Classmaster | Logical | £20.00 | B | Teacher |
| Clip Art for Pagemaker | Parkside Developments | £ 5.80 | B,M | J/S |
| COCA | COIC | £22.00 | B,Ec | S |
| Collector's Catalogue | Acornsoft | £10.00 | B | J/S |
| Connunitel | IT Consultancy | £45.00 | B | S |
| Comp-a-cater | Shumwari | £26.45 | B,B+M | S |
| Cover | SYSTEM | £46.00 | B | Adminis |
| Database | AMS | £24.95 | B,B+M | S |
| Databank | GSN | £15.00 | B | S |
| Database | Acornsoft | £11.90 | B,M,C | J/S |
| Data Logger | Garland | £15.00 | B,E,M | S |
| Dataprobe | Addison Wesley | £57.44 | B | S |
| Dataprobe Add-on Pack | Addison Wesley | £57.44 | B | S |
| Datastore | Wide | £20.13 | B,Ec,M | J/S |
| Datatree | Logotron | £15.00 | B,M | J/S |

| TITLE | PUBLISHER | PRICE | MACHINE | AGE |
|---|---|---|---|---|
| Desfax | Morley Electronics | £ 0.00 | B,M | J/S |
| Display Data/Weather | RESOURCE | £15.95 | B,M | J/S |
| Disasters | LTS | £34.95 | B,Ec,M | J/S |
| Domesday Database South Yorks | RESOURCE | £ 9.95 | B,Ec,M | J/S |
| DIYbase | RESOURCE | £19.95 | B,C,M | J/S |
| D.V.L.C | RESOURCE | £12.95 | B,M | S |
| Ecosoft | AUCBE | £20.00 | B,M,Ec | J/S |
| Edlib | Addison Wesley | £— | B | J/S |
| Electronic News | Nottinghamshire Education | £15.00 | B | J/S |
| Exam Entry | SYSTEM | £— | B | Admin |
| Examination Entry Program | Educational Administration | £150.00 | B | Admin |
| Examination Entry Programs | Hutchinson | £25.00 | B | Admin |
| Examination Results Analysis | Hutchinson | £35.00 | B | Admin |
| External Examinations Records | Chaddington | £20.00 | B,M | Admin |
| Factfile | Cambridge Micro | £19.53 | B,M | J |
| Facts and Figures | S&S | £16.95 | B | |
| Fads | AUCBE | £25.00 | B,B+,M,C,Ec | S |
| Family History Kit | LTS | £45.95 | B,Ec | S |
| File-search | AVP Computing | £12.00 | B | S |
| Filing Cabinet | Kingfisher | £ 9.50 | B | J/S |
| Find | RESOURCE | £22.95 | B,M,Ec | J/S |
| First Filer | Chalksoft | £17.35 | B,M,C | I/J |
| Formdata | SYSTEM | £46.00 | B | Admin |
| Glasgow Census data | Nelcal | £25.00 | B | S |
| Hisdata | Scorby | £ 9.00 | B | S |
| Individual Sixth Form Timetables | Chaddington | £12.00 | B,M | Admin |
| Information Processing | COIC | £25.00 | B | S |
| Inform | Nottinghamshire Council | £15.00 | B | S |
| Infoview | AUCBE | £58.00 | B,M,Ec | J/S |
| Junior Ecosoft | AUCBE | £20.00 | B,M | J |
| Junior Find | RESOURCE | £19.95 | B,M | J |
| Key | GSN/ITCA | £ 4.95 | B,B+,M | I/J/S |
| Legit | MEDUSA | £10.00 | B,B+,M | J/S |
| Librafile | Wilson | £28.60 | B | Teacher |
| Liverpool Census data | Nelcal | £25.00 | B | S |
| Local Viewdata | ISMeC | £19.95 | B | S |
| London Census Data | Nelcal | £25.00 | B | S |
| Longbenton Village Archives | NORICC | £ 3.50 | B,M | J/S |
| Longbenton Census Data (QUEST) | Northern Micromedia | £ 3.50 | BBC | Teacher |
| Macroeconomic Database | Longman | £39.95 | B | S |
| Markbook | Beebsoft | £15.00 | B | Teacher |
| Markbook | Himap | £25.00 | B,E | Teacher |
| Markbook | Chaddington | £12.00 | B,M | Teacher |
| Markplan | Tutorial | £23.50 | B | Teacher |
| Masterfile 2 | Beebugsoft | £22.00 | B,B+,M | S/FE |
| Menu Master Suite | Shumwari | £253.00 | B,M | S/FE |
| Merstham Census | Independent | £ 9.95 | B | J/S |
| Micro-Phile | Ephagy | £14.50 | B | J/S |
| Microphile | RESOURCE | £14.95 | B | J/S |
| Microslides | MEDUSA | £10.00 | B,B+,M | Teacher |
| Microviewdata | Softspot | £28.00 | B | J/S |
| Minitel | Harrogate College | £19.95 | B,M,Ec | Admin |
| MPSS | Management Data Systems | £115.00 | B,M | Admin |
| Nexbase | LTS | £34.95 | B,Ec | S |
| Mova-O Options | Timetable Systems | £48.50 | B+Z80 | Teacher |
| Nova-T Timetabling | Timetable Systems | £— | B+Z80 | Teacher |
| Options | SYSTEM | £23.00 | B | Admin |
| Options-Timetable | AJ | £14.95 | B | Admin |
| Parent Teacher Meetings | Chaddington | £15.00 | B,M | Admin |
| PE Administration | Syntax | £38.50 | B,M | Teacher |
| Picfile | Cambridge Micro | £19.53 | B,M | J |
| Picotel | Camant Software | £49.95 | B | S |
| Primary Databases | RESOURCE | £15.95 | B,M | I/J |
| Protectdata | MedStat | £— | B | Admin |
| Pupil Profile | Modular | £72.50 | B | Teacher |
| Qadministration | Hutchinson | £74.75 | B | Admin |
| QAdmin | Hutchinson | £65.00 | B | Admin |
| Qmap | AUCBE | £20.00 | B,Ec | J/S |
| Quest Adventures | AUCBE | £25.00 | B,M | I/J/S |
| Quest | AUCBE | £27.00 | B,Ec | S |
| Quest in the Curriculum | AUCBE | £12.00 | B | J/S |
| Report | GSN | £38.50 | B | Teacher |
| Rotaview | COIC | £64.00 | B,B+,M | J/S |
| Sailing South | LTS | £34.95 | B,Ec | S |
| School Administrator | Minerva Systems | £69.95 | B,M | Admin |
| Schoolfax | Schoolfax | £35.00 | B,M,Ec | J/S |
| Schooltext | GSN | £15.00 | B | J/S |
| School Database | Toad | £39.95 | B, | Teacher |
| School Timetabling | Temposi | £65.00 | B,Torch | Admin |
| School Administration | Chaddington | £30.00 | B,M | Admin |

# EDUCATION

| TITLE | PUBLISHER | PRICE | MACHINE | AGE |
|---|---|---|---|---|
| Schoolsort | Chalksoft | £14.25 | B,M,C | Teacher |
| Seafax | RESOURCE | £ 9.95 | B,EcC,M | J/S |
| Shape Happy | PAVIC | £ 8.75 | B | I/J |
| Sixth Form Special | Chaddington | £20.00 | B,M | Teacher |
| Sportsmaster | Himap | £17.00 | B | Teacher |
| Sports | Greenwood | £ 7.50 | B | Teacher |
| Staff Replace | Viztech | £29.50 | B | Admin |
| Studentdata | Longman | £165.00 | B | Admin |
| Superstore | ESM | £33.95 | B,M,C | J/S |
| Survey | Greenwood | £ 5.00 | B | J/S |
| System Delta | Minerva | £64.95 | B,B+,M | S |
| Teach Your Micro | MEDUSA | £ 6.00 | B,B+ | J |
| T-Cover | Yorke House | £20.00 | B,M | Admin |
| T-Squared | Yorke House | £40.00 | B,M | Admin |
| Teled | Betasoft | £— | B | J/S |
| Timetabling | Educational Administration | £150.00 | B | Admin |
| Timetable Construct | Viztech | £59.50 | B | Admin |
| Timetabling Software | Wida | £34.50 | B,M | Admin |
| Timetabling 1-6 | Hutchinson | £15.00 | B | Admin |
| Timetable Administrator | Toad | £100.00 | B | Teacher |
| Timetable Database | Cambridge Micro | £23.43 | B,M | Admin |
| Timetable Tests | Viztech | £24.50 | B | Admin |
| Tree of Knowledge | Acornsoft | £ 9.95 | B,E | J/S |
| UCCAplan '87 | Tutorial | £29.95 | B | S |
| ViewChart | Acorn User | £12.95 | B,B+,M,E | S |
| ViewStore | Acornsoft | £59.80 | B,M,C | S |
| Vu-file | Psion | £14.95 | B | S |
| Weather | GSN | £14.38 | B | J/S |
| Weather Data | AUCBE | £13.80 | B,Ec | S |
| Which Flower | RESOURCE | £ 9.95 | B,M | I/J |
| Worldwide | LTS | £45.95 | B,Ec | S |
| GRAPHICS | | | | |
| 3-D View | Ibbotsun | £35.00 | B,B+,M | S |
| 3D Graphics Development | Glentop | £25.00 | B | S |
| 3D Transformations | MUSE | £18.00 | A,B,B+ | S |
| 3D Zicon | AMS | £24.95 | B,B+,M | S |
| Airbrush | Peter Sharpe | £— | B | S |
| AMX Design | AMX | £69.95 | B,B+,M,C | S |
| AMX Mouse | AMX | £89.95 | B,B+,M | J/S |
| Animator | SYSTEM | £14.00 | B | J/S |
| Animator | Arnold Wheaton | £ 9.95 | B | J/S |
| Artroon | Clares | £27.00 | M,C | J/S |
| Birdland | Aztec | £ 8.50 | B,M | J/S |
| Supergraph | Glentop | £28.75 | B | S |
| Cadlink | Linear Graphics | £ 8.75 | B | S |
| CADmouse | Wigmore House | £34.99 | B | S |
| Circuit | Capital Media | £ 8.00 | B | S |
| Colour | MUSE | £ 6.50 | B,B+ | J/S |
| Colouring Book | Addison-Wesley | £ 9.95 | B,E | J |
| Colouring Book | BBC | £ 9.95 | B,Ec | J |
| Computer Aided Design | Heinemann | £22.50 | B | S |
| Creative Graphics | Acornsoft | £ 9.95 | A,B,E,M | J/S |
| DDX | Ibbotson | £125.00 | B,B+,M | S |
| Design | Beebugsoft | £12.00 | B | J/S |
| Design a House | Mercury Music | £18.95 | B | J/S |
| Digital Drawings | Ibbotson | £65.00 | B,B+,M | S |
| Doodle | Hilditch | £10.00 | B,M | J/S |
| Drawing | BBC | £10.00 | A,B | J/S |
| Drawing Pictures & Puzzles | ESM/SESS | £ 8.95 | B,E | S |
| Drawing Pictures | SESS | £ 8.45 | B | I/J |
| Drawstick | BBC | £ 9.95 | B | J/S |
| Edfax | Softspot | £18.00 | B | J/S |
| EDG Graphics Package | AVP Computing | £15.00 | B | S |
| Electronic Paintbrush | Ephagy | £14.95 | B | J/S |
| Electronic Paintbrush | RESOURCE | £14.95 | B | J/S |
| Electronic Colouring Book | Addison Wesley | £11.44 | B | I/J |
| Facemaker | ASK/ESM | £ 9.95 | B,E,M,C | I/J |
| Gallery | Acorn User | £ 6.95 | B,B+,M,C,E | I/J/S |
| Gallery 2 | Acorn User | £ 6.95 | B,B+,M,C,E | I/J/S |
| Geometric Design | Alan Wiltshire | £14.00 | B | I/J |
| Glass | MUSE | £10.00 | B,B+ | S |
| Grafik | Nidd Valley | £14.95 | B | S |
| Graphics Utilities | Acorn User | £ 7.95 | B,B+,M,C,E | I/J/S |
| Graphito | Addison Wesley | £22.95 | B | J/S |
| Graphics Extension ROM | Acornsoft | £29.90 | B | S |
| Harlequin | LTS | £14.95 | B,B+ | J/S |
| Hershey Characters | Beebugsoft | £12.00 | B | S |
| Image | Cambridge Micro | £39.95 | B,M | S |
| Jigsaw/Word Puzzles | Promotional ArtWork Systems | £14.50 | B | I/J |
| Jigsaw | ESM | £11.85 | B,B+,M | I |
| Jigsaw | Golem | £ 6.95 | B,E | I/J |
| Juggle Puzzle | ASK/ESM | £ 9.95 | B,M,C | J |
| Knitting Softwear | Newsight | £39.95 | B,B+ | S,FE |
| Linchart | Linear Graphics | £19.50 | B,M,C | S |
| Lincad | Linear Graphics | £49.50 | B,M,C | S |
| Linmap | Linear Graphics | £49.50 | B,M,C | S |
| Linscan (inc hardware) | Linear Graphics | £150.00 | B | I/J/S |
| Linsign | Linear Graphics | £19.50 | B | S/ Teacher |
| Lintrack PCB Designer | Linear Graphics | £250.00 | B | S |
| Lintrack Demonstration Package | Linear Graphics | £10.87 | B | S |
| Lintrack | Linear Graphics | £250.00 | B | S |
| Lintronics | Linear Graphics | £19.50 | B | S |
| Met Maps | Garland | £13.51 | B,M | S |
| Merlin's Magic Shop | GSN | £25.00 | B | J |
| Micro Artist | Paean | £ 7.50 | B,B+M | J/S |
| Mosaic | Hilditch | £10.00 | B,E,M | I/J/S |
| Mosaic | AUCBE | £20.00 | B,Ec,C | J/S |
| Mousepaint | Wigmore House | £11.50 | B | J/S |
| Movie Maker | Slippery Slug | £29.90 | B | S |
| Mosaic | Hilditch | £ 9.50 | B | I/J |

| TITLE | PUBLISHER | PRICE | MACHINE | AGE |
|---|---|---|---|---|
| MUCAD | Heinemann | £33.00 | B | S |
| Newt | ESM | £12.00 | B,B+,M | J/S |
| Novacad II | Technomatic | £— | M | S |
| Ollie Octopus' Sketchpad | Storm | £ 9.95 | B,Ec | I/J |
| Pagemaker | AMS | £49.95 | B,B+,M,C | S |
| Painting | BBC | £10.00 | A,B | J/S |
| Paintmaster | Beebugsoft | £12.00 | B,M,C,E | J/S |
| Pazazz | ASK/ESM | £14.95 | B | J/S |
| Perspective | Aztec | £ 6.50 | B,B+,M,C | S |
| Picpop | Longman | £15.95 | B | J |
| Picture Builder | Hill MacGibbon | £ 9.95 | B | J |
| Picture Animation | Promotional ArtWork Systems | £14.95 | B | J/S |
| Picture Craft | BBC | £19.95 | B,B+,M | I/J/S |
| Picture Book | Ed Soft | £ 7.95 | B | I |
| Picture Craft | BBC | £19.95 | B,B+,M,Ec | I/J |
| Picture Maker Plus | RESOURCE | £14.95 | B | J |
| Picture Maker | Acornsoft | £ 9.95 | B | J/S |
| Plane Designer 1 | Dudley | £19.95 | B | J/S |
| Plane Designer 2 | Dudley | £24.95 | B | J/S |
| Plotmate ROM | Linear Graphics | £35.00 | B | J/S |
| Primary Introdctory Pack | AB European | £12.70 | B | J |
| Robin Design and Graphics | Educational Software | £17.25 | B | J/S |
| Quickdraw | Selective | £ 8.00 | B,M | J/S |
| Similar Objects | Cambridge Micro | £17.50 | B,M | S |
| Scredit | Selective Software | £ 8.50 | B,M | J |
| Sprites | Beebugsoft | £12.00 | B,E | S |
| Stax | Aztec | £ 8.50 | B,M | I/J |
| Super Art | AMS | £49.95 | B,B+,M,C | S |
| Tecdv | Longman | £17.50 | B,Ec | S |
| Tele Sequence | Capital Media | £ 8.00 | B | J/S |
| Tele Screen | Capital Media | £ 8.00 | B | J/S |
| Testing Assessment and Study of Kitchens | British Gas | £— | B | S |
| Tex-Print | Ephagy | £ 8.00 | B | J/S |
| Tpomap II | Solent | £25.00 | B | S |
| Views/Faces | Primary Programs | £ 5.95 | B,M | I/J |
| Workshop | Acornsoft | £ 9.95 | B | I |
| AUTHORING PROGRAMS | | | | |
| Aidfax | Computer Aids | £20.00 | B | Teacher |
| Author | ESM | £34.50 | B,B+,M | J/S |
| Author | ESM | £30.00 | B,B+,M | J/S |
| Choicemaster (European Languages) | Wide | £28.75 | B,Ec,M | Teacher |
| Computer Aided Graded Exercises | RESOURCE | £16.95 | B | Sp |
| Cloze | Wida | £28.75 | B,Ec,M | Teacher |
| Cloze Program | AVP Computing | £15.00 | B | S |
| Clozemaster – European Languages | Wide | £28.75 | B,Ec,M | S |
| Crosswords | HS | £ 7.95 | B,M,C | J/S |
| Crossword Master English & Italian | Wide | £31.63 | B,Ec,M | J/S |
| Crossword | Macmillan | £15.00 | B | S |
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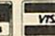
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# THE NETWORK PAGE

**Information on transferring data between Compacts and Masters on a network**

***Robin Newman***

I was asked recently to transfer some BBC software from 5.25-inch discs to the Compact. Notwithstanding David Atherton's excellent article in January, I decided to use the Econet.

The Compact accepts the same Econet module as the Master 128, and so it was a five minute job to transfer this and the ANFS chip from a Master. There were two immediate problems. First, the Compact refused to recognise early versions (4.18 and 4.21) of the ANFS chip, although it worked happily with ANFS 4.25. Second, the original 'SET' utility to adjust the network station number on a Master 128 did not work (presumably because the Compact uses an EEPROM instead of battery-backed CMOS).

A phone call brought a new version which works for both Master 128 and the Compact. Teething problems overcome, it was fairly simple to save files from a Master 128 fitted with DFS and Net onto the network where it was subsequently saved onto the Compact, using both ADFS and DFS (loaded into the Compact's sideways RAM) – you can format a Compact 3.5in disc using DFS, although it is a waste of disc capacity. I was impressed with the high degree of compatibility, and the only change I had to make to an extensive range of Master software was to amend my own programs which made use of the KMB and KBM utilities (October, page 163), as OSBYTE 0 which returns the MOS version gives five for a Compact, as opposed to three for a Master 128 and four for a Master ET. To cope with all three, the code becomes:

```
A%=0:X%=1:T%=(USR(&FFF4)
AND &FF00)/&100:IF T%>2 AND
T%<6 THEN *KBM
```

Now to the meat of this month's issue. In answer to Fiona Jamieson's plea (December 1986) I would like to discuss two machine code utilities which enable one machine to control simultaneously the keyboards of several others. A megalomaniac's *REMOTE! Before network managers tear their hair out in horror, let me reassure you that the system requires the co-operation of all the machines involved, and one station cannot single-handedly take over all the others. The idea and original program came from John Shakeshaft, a former pupil at Oundle School. It was developed for teaching *Wordwise* on the network. The idea was that the teacher should be able to describe the various editing features and embedded commands while actually carrying them out on the pupils' machines. It will however work in a wide variety of other situations as well.

| Offset | | Value |
|---|---|---|
| 0 | &80 | Transmit flag |
| 1 | &D7 | Port required for reception |
| 2 | &FF | Station number &FFFF |
| 3 | &FF | Broadcast to all stations |
| 4 | code | Character code to broadcast |
| 5 | | |
| 6 | | |
| 7 | | A further 7 bytes are broadcast but not used by this program |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |

**Table 1. The transmit block is set up**

The system makes use of the concept of 'events', and the broadcast facility on the network, whereby a short packet of eight data bytes can be sent simultaneously to all machines which wish to receive it.

'Events' are a simple way of handling 'interrupts'. Certain conditions trigger the computer to interrupt its current task, and to jump to a separate piece of code. This then deals with the cause of the interruption and hands back control. As far as the user is concerned, it's as if nothing had happened. At the controlling station an event is enabled which is triggered each time a key is pressed. The relevant key code is then broadcast around the network. At the receiving stations the vertical synchronisation pulse which occurs 50 times a second is used to generate an event. The event routine scans a network 'receive block'. This has been set up to listen for broadcasts to see if a character has been received. If it has, then the character code is inserted in the input buffer, just as if it had been typed at the keyboard. The receive block is then reset to await the next character to be sent.

Let us look at the programs in more detail. Listing 1 on the yellow pages is the Control program. To make sense of this start at line 1300. First the action of the Escape key is switched off (OSBYTE 229), so it merely produces a character code (27) like any other key. Then the program sets up the event routine. The contents of the event vector (&220 and &221) are saved and then it is loaded with the address of the new event handling routine. The final stage is to enable the required event. Pages 288 to 293 of the Advanced User Guide give further details.

The event routine itself starts at line 150. First a check is made to see if the event is the correct one (line 170). If so, all the registers are saved. The program uses CTRL-f8 and CTRL-f9. So these keys do not produce any effect externally, OSBYTE 227 is used to disable them. Now the character code is retrieved (lines 310-350) and a network transmit parameter block is set up, by copying preset values from a data area (lines 360-400). The character code to be transmitted is inserted in line 400. The block looks like table 1 illustrated above.

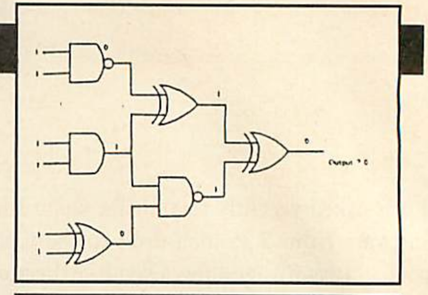
The port number (&D7) is like a radio channel. The receiver must be tuned to the same value if it is to receive the data. Ten attempts are allowed before the program gives up and the character is lost. OSWORD &11 does the actual transmitting, and OSBYTE &32 polls to see if the transmission is completed, and if so whether successfully. Further details are given in the comments on the listing.

Having transmitted to the character, we now deal with its effect at the control station. If the character code is &A8 (CTRL-f8) then this switches the remote station on and off. So that the control station can keep track, it maintains a flag

# NEW RELEASES

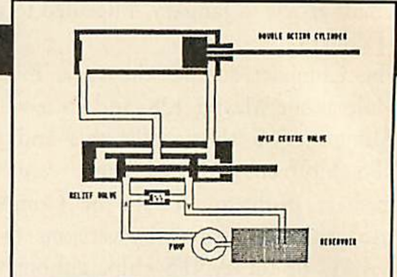
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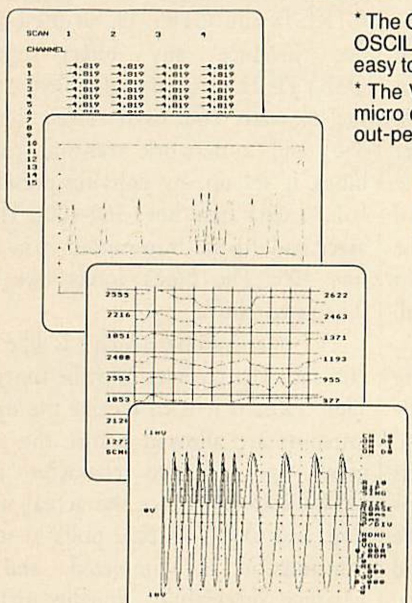
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**Design Consultancy**

which causes it to beep each time the keyboard is switched off (lines 880-970).

Separate keys were not used because the programs presented here are part of a larger version. These functions use the other CTRL-function keys. If the character code is &A9 (line 630) then the control link is terminated. At the control end this involves the code from lines 740 to 1020. The event handler is disabled, then the event vector is restored to its original state. Finally, the Escape key is returned to its normal action before the event routine is exited for the last time.

*Wordwise* (which the program was originally developed to control) uses CTRL-Arrow keys. So that these would still work, lines 690 to 720 re-enable the CTRL-f keys to give the relevant codes, &90 plus the number of the function key, when one of these four keys is used, so that they work correctly on the control machine. One final key has to be dealt with, and that is Escape. Its normal action has been inhibited, but it must still appear to behave as usual in the control machine. This is achieved by generating an Escape condition using OSBYTE &7D.

Turning now to the receiver program, *SLAVE (listing 2). The entry point is line 1370. This adjusts the event vector to point to the new routine, disables the receiving station's keyboard, clears the input buffer and opens a network receive block to receive the transmitted characters, before enabling the vertical sync event and exiting (lines 1370-1560). A subroutine from lines 1000 to 1160 opens the receive block. This starts by copying data into the receive block area (lines 1010-1060). The block then looks like table 2.

Lines 1070-1120 'open' the block, and if successful the zero offset byte in the block is set to the control block number (non-zero) allocated for the reception. About 16 different internal control blocks are available for reception at a time. Note that this program merely retries to open a block if it is not successful. There was no room to incorporate full error-handling if all receive blocks were open, but this is an extremely unlikely event.

Every fiftieth of a second the event handling routine is entered (line 170). This checks the cause (line 180), saves the registers and polls the receive block (lines 290-340) to see if a character has been received. If a character has been received the control block is 'read' (lines 440-480). Then a complication occurs. Normally the character will be transferred to the buffer pointed to by the control block. However, for NFS 3.34, in the special case of a broadcast reception, the character remains in byte offset five of the receive block. Thus we have to use OSARGS to determine which NFS is present in the machine (lines 490-530). This returns two in the accumulator (a register) for NFS 3.34 and one for NFS 3.60 and ANFS. An appropriate adjustment is made (lines 560-570).

| Offset | | Value |
|---|---|---|
| 0 | 0 | Set to control block number on exit |
| 1 | &7F | Receive block flag (modified on reception) |
| 2 | &D7 | Port number for reception |
| 3 | 0 | Transmitting station number 00 matches |
| 4 | 0 | any station transmitting on this port |
| 5, 6, 7, 8 | buffer address start | address of buffer for received data. But there is a complication for NFS3.34 |
| 9, 10, 11, 12 | buffer address end(+1) | End address+1 of data buffer |

**Table 2. Opening the receive block**

The character code is now examined (lines 590-650) so that codes &A8 (keyboard toggle), &A9 (sever) and 27 (Escape) can receive special treatment, and all other character codes received are inserted into the keyboard buffer (lines 770-810) before a new receive block is opened and the event routine is exited. The keyboard toggle code (lines 700-760) switches the keyboard on or off on successive calls. An internal flag is set to one to disable the keyboard and zero enables it. Each time OSBYTE 201 is used, this flat is first ANDed with Y (one) which has no effect, and then EORed with X (one) thus causing it to change 0,1,0,1 and so on.

The Escape code (27) causes an Escape condition to be set (lines 640-690) and finally the sever code (lines 870-990) disables the vertical sync event, re-enables the keyboard and then restores the event vector contents before exiting the event routine for the last time.

Quite an intricate bit of code, but I think you will find it worth typing in. The code is assembled to run in page &B, which is the function key definition buffer for a BBC B and unused in a Master or Compact, provided you configure it appropriately (October, page 163). This is a convenient place for use with *Wordwise*, if you do not wish to use your own function key definitions. Alternatively, change line 60 in both cases to base%=&A00 or some other appropriate page. Having run the program merely copy the resulting *SAVE line to save the machine code.

The network should be selected as the current filing system for the transmit program to work, although the receive program will work even if the network is not selected as the current filing system. Type *SLAVE on each of the receiving stations to install the receiver program, and *CONTROL on one machine which is to act as the control station. All the receiver keyboards will be frozen, and anything typed on the control machine will be echoed on the receiving machines.

CTRL-f8 typed on the control machine will re-enable the receiving machines' keyboards. In this state they will respond to both local input and characters transmitted from the control machine, so beware because confusion can result! CTRL-f8 typed again on the control machine will cause that machine to beep, and the receiving stations' keyboards to be disabled once more. The control link is broken by typing CTRL-f9 on the control machine whereupon all machines on the network should return to normal.

If the network activity is very busy you may lose some characters as the broadcast facility is not totally reliable because the transmitting machine has no means of knowing whether all the stations listening have received the data correctly or not.

*Turn to the yellow pages index on page 113 for listing details.*

**JARGON BOX**

**KBM** Program to transfer *KEY difinitions from BBC B to BBC Master series computers. The key definitions are held in memory page &B on a BBC B, but this is used for network workspace in a Master series micro. Programs often *LOAD key definitions directly into this area, and so they don't work on a Master. KBM alters the format after the file has been loaded.

**KMB** Transfers *KEY definitions from Master format to model B format.

**REMOTE** a standard Econet utility to control the operation of one station from another station. Some stations can be protected against this operation with a *PROT command.

# BUSINESS

## PROPER PROTECTION

**People may be using their micros without realising they are breaking the law**

***Roger Carus***

Since the Data Protection Act (DPA) was passed in July 1984 there has been a steady stream of reports of micro users being worried or annoyed about the effect that it was having on their activities. First, you need to know whether it applies to you, and second, what you need to do about it. This article can help you make up your own mind, but is no substitute for getting full information.

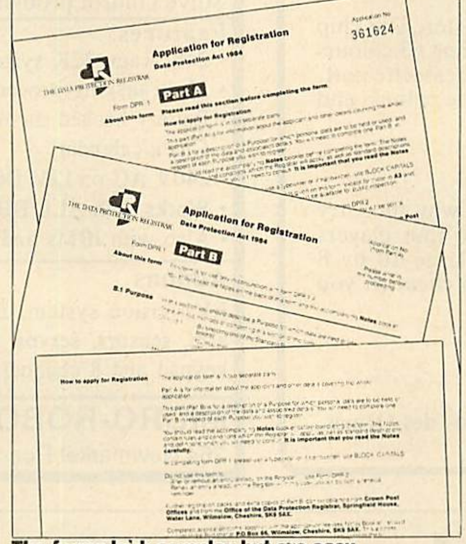
The intention of the legislation is to ensure reasonable privacy. Yet anyone with the simplest micro can quickly build up a mass of confidential information. The Data Protection Registrar (DPR) is only making sure that you keep to certain rules.

It is a law and there are penalties if you break it, but the DPR is likely to be sympathetic if you try to do the right thing and make a genuine mistake. The first thing anyone should do is to get good reliable information about the Act and how registration works. This is easy as you can get a 'DPA 1984 Registration Pack' free from any Post Office and it contains a well written booklet along with the application forms. You can also get 'Guideline No 1' on the Act and two 'Questions and Answers' booklets from the Office of the DPR, Springfield House, Water Lane, Wilmslow, Cheshire, SK9 5AX.

The Registrar says: 'If you use computers only for personal, family or household affairs, or for recreational purposes, then you are exempt from the Act and need take no further action. If on the other hand, you or your organisation use computers to process information about individuals for business or professional purposes, you should register.'

The main problem facing most readers is likely to be the common one whereby they give voluntary assistance to a local church, sports club, or other such group. It is probable that they do not need to register, but they will need to be sure that certain rules are observed.

They probably need to be an officer of the club (eg, membership secretary) so that it is clear that they are bound by its rules and this avoids them becoming, in effect, a 'computer bureau'. The organisation may need to register, but not if it is unincorporated (not a limited company) and if the data is limited to just members' names and addresses and accounts data. If the club is a branch of a larger, perhaps national organisation, then it may be better for the wider body to be the one to register.


Application for Registration
Data Protection Act 1984
361624
Part A
Part B

The forms look complex but are easy

If you are using the 'clubs' provision, then it is important for every member to be fully informed, perhaps in a circular letter, that a computer record is being maintained and what it consists of, how to see it and how to object to any entry: if they do object then the entry should be removed and maintained by hand – unless the club makes an entry a condition of membership.

It is also suggested that after the initial stage of setting up the system, a club might include a question in its membership application forms on the lines of: 'Do you object to the club holding your membership record on computer?'

The data protection principles are based upon the requirements of the Council of Europe Convention for the Protection of Individuals with Regard to Automatic Data Processing of Personal Data. Compliance with the principles is central to the purpose of the Act. The data protection principles are as follows (slightly simplified):

- The information included in personal data must be obtained and processed fairly and lawfully.
- Personal data may be held only for specified and lawful purposes.
- Personal data held for any purpose may not be used or disclosed in any manner which is incompatible with that purpose.
- Personal data held may only be adequate, relevant and must not be excessive in relation to that purpose.
- Personal data must be accurate (correct, and not misleading) and where necessary kept up to date. If you cannot make sure that it is accurate then that must be made clear by marking the record in some way.
- Personal data may not be kept for any longer than is necessary for the purpose for which it was collected.
- An individual is entitled at reasonable intervals and without undue delay or expense to be informed by any data user whether he holds personal data about him and to have access to it and have it corrected or erased.

If you are a 'computer bureau':

- Appropriate security measures must be taken against unauthorised access to, or alteration, disclosure or destruction of personal data and against its accidental loss or destruction.

It is quite important to understand the terms which are used by the Registrar, and here are the main ones you will need:

**Personal data** consists of information about a living individual, including expressions of opinion, but excluding any indication of the intentions of the data user in respect of that individual.

**Data users** are organisations or individuals who control the contents and use of a collection of personal data processed, or intended to be processed, automatically.

**A computer bureau** is an organisation or individual who processes personal data for data users, or allows other data users to process personal data on his equipment. An organisation or individual may rank as a computer bureau (for example, by providing back-up facilities for another data user) without actually being in business as a computer bureau.

**A data subject** is an individual to whom personal data relates.

The staff of the DPR are helpful, but they are faced with an enormous problem in getting everyone registered in the time scale available. Peter Tarrant speaking on behalf of the Registrar was only too willing to pass on the message to users that they are trying to keep it simple.

In 1986 there were over 2000 reports of their work in the Press and they spent £500,000 on public advertising to get 130,000 registrations of all kinds. There have also been direct mailings to obvious users such as accountants. They think there are still almost as many again to register, but are sympathetic to those who are late so long as no evasion or anything else improper is intended.

Most small micro users have understood the instructions, and very few problems have arisen with home or personal use. The most frequent confusion they have met is with payroll and accounting records which are exempt – until you want to add more information: suppose that you have a payroll file of staff (which is exempt) and decide to add to it records of sex and date of birth, then it must be registered.

Filling in the registration form also calls for care, the Registrar is quite understandably suspicious where someone simply ticks all the boxes intending to cover everything! It is probably worth indicating that you might become a computer bureau on the form since you never know when you might have a breakdown and need to farm out a batch of work to avoid an unnecessary delay.

Peter Tarrant, speaking for the Registrar points out that the charge of £22 for three years is not large and allows you to be covered at least so far as trying to comply, and any later changes made in the registration data on the alteration form are entirely free of charge.

The unregistered users will start to be spotted in November 1987, when people will be able to insist on seeing their data: the Registrar is unlikely to be sympathetic to those who have not registered. In connection with this he also asked me to pass on the reminder that users should be very careful to ensure that anyone wanting to see their personal data is who they claim to be to avoid possible fraud.

The power of the BBC micro in its expanded form makes the storage of data on a large scale a very tempting commercial preposition, and the sale of mailing lists or of any kind of personal data is tightly controlled by the Act. The extended use into electronic noticeboards and mailboxes adds new areas where the Act applies and presents potential difficulties.

## Filling in the forms

At first sight the two forms you need to complete look frightening, but they are not really so bad.

Part A is very simple and is not much more than your name and address – or that of your business. For the reasons given earlier it is probably best to describe yourself as a 'data user and bureau' in question A1 and to register for the full three years (A8), since that costs no more. You also need to send the payment for £22 for the period of registration.

Part B presents more difficulties since it is intended to describe the purposes and nature of your data. Use method one of describing the standard purposes (B1) if you possibly can, or you have to go into long descriptions, and the checklist is much simpler and easier to use, even though it has 40 choices.

In the same way you can use another 40 descriptions of data subjects to identify those you are most likely to be concerned with: it sounds difficult but the titles are clear and comprehensive, and the main problem is to guess which you may potentially want to include in the future.

The data classes (B2) offer a choice of 132 possibilities ranging from things such as 'personal characteristics – habits' (C013) to 'health and other classes – religious beliefs' (C123).

Sources and disclosures (B3) simply describes where the data comes from, and again offers 73 choices with the usual space for you to add your own!

Finally, if you are not exhausted, you need to identify any likely places abroad where you may want to send the data under the section which is titled 'overseas transfers' (B4).

Altogether I estimate that completing the form would take less than half an hour unless you have a large business or a specially difficult response to make.

Andy Purkiss of Namebug, one of the largest computer clubs and chairman of the Association of Computer Clubs, threw some interesting light on the experiences of their members. They give their members a three-way choice before adding them to their computer list. They can be added to the membership list and permit their names to be disclosed, or not disclosed, or alternatively not listed.

He pointed out how useful such a list would be to burglars! Most members are not too worried, but a few do not want their names to appear anywhere. Their greatest problem is with bulletin boards, and we agreed that anyone running one must register.

Some readers who work in education may wonder about their position, and how far they are responsible. Question four in 'Questions and Answers' makes it clear that while the Act clearly applies, most establishments will need to be registered either through their local authority, or directly, if independent. They are not liable for the use made of the equipment by staff or pupils in extra curricular activities, since the education authority cannot be said to be in control of their actions.

If you follow these guidelines you will not go far wrong, and certainly will get sympathetic consideration if you do accidentally make a mistake.

### CHECK-LIST

- Do you store any kind of information about living persons using automatic data processing equipment?
  If no, forget the Act! If yes, then get a DPA Registration Pack from the Post Office and read the booklet.
- Have you any such data beyond a simple mailing list or record of accounts?
  If no, you probably do not need to do anything more.
- If you have more than that data, are you simply an individual or an unincorporated club?
  If yes, make sure that all those on the list know you have it, what is included, what it will be used for and give them the chance to have their entry corrected or removed. Provided you do that, you probably do not need to register.
- If you run a bulletin board, transmit data overseas or make any more sophisticated use of the systems, you probably need to register.
- If you own or manage a registered company and have any personal data, it is almost essential that you register.

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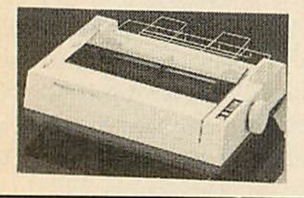
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| Okimate 20 Thermal Printer | £159.00 |
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| Epson EX-Series Colour Upgrade Option | £55.00 |

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| New Oki Laserline 6 - 6 pages per minute | £1599.00 |
| HP Laserjef73lus - The Leader | £2299.00 |
| Cherry A3 Digitizer | £475.00 |
| Roland 880A Plotter - Best Value A3 Plotter | £649.00 |
| QMS K8 Laser Printer - 8ppm | £1695.00 |

## CABLES AND THINGS

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| IBM-Compatible Centronics Parallel Cable (Round) | £11.90 |
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| Amstrad 1512 10mb Hard Disk/Mono Monitor | £776.00 |
| Amstrad 1512 20mb Hard Disk/Mono Monitor | £873.00 |
| Amstrad 1512 10mb Hard Disk/Colour Monitor | £940.00 |
| Amstrad 1512 20mb Hard Disk/Colour Monitor | £1037.00 |
| Amstrad 1512 SD Mono with 20mb Upgrade | £799.00 |
| Amstrad 1512 SD Colour with 20mb Upgrade | £969.00 |
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| Amstrad PCW 8256 | £374.00 |
| Amstrad PCW 8512 | £470.00 |

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| | |
|---|---|
| MacDougall 286 AT 640k R/T clock/8mz/ 20mb HD/mono monitor/port | £999.00 |

## OLIVETTI PCS

| | |
|---|---|
| Olivetti M24 Single Floppy Base Unit/640k | £1060.00 |
| Olivetti M24 Double Floppy Base Unit/640k | £1148.00 |
| Olivetti M24SP 20mb/single floppy Base Unit/640k | £1618.00 |
| Olivetti Monochrome Monitor | £169.00 |
| Olivetti 83 or 102-key keyboard | £120.00 |
| Olivetti MS-DOS/GW-Basic Pack | £51.00 |
| Olivetti Colour Monitor | £449.00 |
| Olivetti M28 512k/20mb Hard Disk | £1884.00 |
| Olivetti M28 512k/40mb Hard Disk | £2392.00 |
| Special Offer: Olivetti M24 with 640k, 7-slot Bus Converter Monitor, MS-DOS/GW-Basic, Keyboard, Seagate 20mb Hard Disk | £1599.00 |
| M24SP Complete System (Monitor/Keyboard/DOS) | £1899.00 |

## KAYPRO PCS

| | |
|---|---|
| Kaypro 286i AT 640k, 20mb HD, Mono Monitor, Dos 3.2 | 1636.00 |
| Kaypro 286i AT 640k, 20mb HD, Colour Monitor, Dos 3.2 | £1878.00 |
| Kaypro 2000 Portable 768k RAM, 3.5in fd | £898.00 |
| Kaypro 2000 as above, but with larger screen | £1018.00 |
| Optional Base Unit for Kaypro 2000 | £498.00 |

## EPSON PC'S

| | |
|---|---|
| Epson Taxi PC, 256k RAM, Single Floppy | £466.00 |
| Epson Taxi PC, 256k RAM, Double Floppy | £539.00 |
| Epson Taxi PC, 256k RAM, 20mb Hard Disk | £870.00 |
| Epson Taxi PC 256k RAM Upgrade | £99.00 |
| Epson PC+ 640k RAM, Single Floppy, Video Card | £899.00 |
| Epson PC+ 640k RAM, Double Floppy, Video Card | £1005.00 |
| Epson PC+ 640k RAM, 20mb Hard Disk, Video Card | £1199.00 |
| Epson AX-20 AT 640k RAM, 1.2mb Floppy, 20mb HD | £1799.00 |
| Epson AX-40AT 640k RAM, 1.2mb Floppy, 40mb HD | £2249.00 |

All Epson PC's, PC+'s and AT's require monitors and all PC's require Monitor Adaptor Cards.

## COMPAQ

| | |
|---|---|
| Compaq Portable II Model 2 | £1947.00 |
| Compaq Portable II Model 4 | £2772.00 |
| Compaq Portable III Model 1 12MHz/640K/1 1.2MB FD | £2437.00 |
| Compaq Portable III Model 2 640K/1 1.2MB FD/20MB HD | £2963.00 |
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| Compaq 286 EGA Colour Adaptor | £372.00 |
| Compaq 286 High Resolution EGA-style Colour Monitor | £413.00 |
| Compaq Dual-Mode Mono Amber or Green Monitor | £162.00 |
| Compaq MS-DOS 3.2 | £60.00 |
| Compaq 10MB Tape Back-Up Option | £436.00 |
| Compaq 40MB Tape Back-Up Option | £516.00 |

All Compaq Deskpro computers require Monitors, Monitor Adaptor Boards and MS-DOS.

## TOSHIBA

| | |
|---|---|
| Toshiba T3100 Lap Top | £2675.00 |
| Toshiba T3100 Carrier Bag | £40.00 |
| Toshiba T2100 Lap Top | £1800.00 |
| Toshiba External 5.25 Disc Drive | £335.00 |

## ATARI HARDWARE

| | |
|---|---|
| Atari 520STM 512k RAM, TV Modulator, no disk drive | £215.00 |
| Atari 520STFM 512k RAM, disk drive | £318.00 |
| Atari 1040STF with Mono Monitor, 1mb RAM, disk drive | £564.00 |
| Atari 1040STF with Atari SC1224 Colour Monitor | £775.00 |
| Atari SF314 1mb Floppy Disk Drive | £155.00 |
| Atari SH204 20mb Hard Disk Drive | £557.00 |
| Cumana CS354 1mb Floppy Disk Drive | £128.00 |
| Cumana CS358 double 1mb Disk drive Unit | £204.00 |
| Atari SM125 High resolution Monochrome Monitor | £115.00 |
| Atari SC1224 Colour Monitor | £307.00 |

## ATARI TOP 20 SOFTWARE

| | |
|---|---|
| Rainbird Starglider | £19.00 |
| Computer Concepts Fast Basic | £66.00 |
| Flight Simulator II | £37.00 |
| Arena Sports Simulation | £23.00 |
| Modula-2 Development System | £73.00 |
| Modula-2 ST Toolbox | £36.00 |
| Prospero Pro Fortran 77 | £106.00 |
| VIP Professional (Lotus Clone Gem version) | £169.00 |
| Metacomco Lattice C Compiler | £71.00 |
| Metacomco Macro Assembler | £36.00 |
| Metacomco Pascal Compiler | £64.00 |
| Migraph Inc Easy Draw | £59.00 |
| Rainbird Soft The Pawn | £18.00 |
| Microdeal Time Bandit | £22.00 |
| Chipsoft ST Accounts 107 Cashlink Accounts | £250.00 |
| Mark Williams C Compiler | £133.00 |
| Atari Fastcom | £37.00 |
| World Games Simulation | £18.00 |
| Megamax C Compiler | £116.00 |

## DISKETTES

| | |
|---|---|
| Computer Express Branded 5.25in DS/DD 48tpi disks | £1.00 each |
| Computer Express Branded 5.25in DS/DD 96tpi disks | £1.80 each |
| TDK 3.5in DS/DD Diskettes | £2.99 each |
| Computer Express Branded 3.5in DS/DD Diskettes | £2.35 each |

## COMMUNICATIONS

| | |
|---|---|
| Miracle WS4000 V21-V23 Modem | £135.00 |
| Da-Com DSL 2123 AD/Hayes | £225.00 |
| Sage Chitchat Comms Pack (Modem/Software/Cable) | £210.00 |
| Crosstalk IV Comms Software | £99.00 |
| Sage Chitchat Comms Software | £85.00 |
| One-To-One Electronic Mail Subscription | £20.00 |
| RS232 serial modem cable | £15.00 |

## HARD DISKS, ADD-ON BOARDS, CHIPS

| | |
|---|---|
| Dysan/Western Digital 10mb File Card | £300.00 |
| Miniscribe 20mb Hard Disk Card | £350.00 |
| Miniscribe 30mb Hard Disk Card | £400.00 |
| 64k dRAM chips (nine to make 64k) | £1.15 each |
| 256k dRAM chips (nine to make 256k) 150 nanosecond | £3.00 each |
| 8087 5mz Maths Co-Processor | £125.00 |
| 8087 8mz Maths Co-Processor | £165.00 |
| 80287 Maths Co-Processor | £219.00 |
| AST SixPack Plus 64k memory Multifunction Card | £197.00 |
| Qubie SixShooter Multifunction Card 64k memory | £150.00 |
| Intel Aboveboard with 0k installed | £325.00 |
| Plus Hardcard 10mb | £350.00 |
| Plus Hardcard 20mb | £595.00 |
| Qubie 20mb HardPack | £450.00 |
| Seagate 20mb Hard Disk with WD Controller & Cables | £350.00 |
| Hercules Colour Card | £100.00 |
| Everex Mini Magic Ram Expansion Card (0K) | £70.00 |
| Hercules Graphics/Graphics Plts Card | £189.00 |
| Clone Hercules Card | £85.00 |
| Mouse Systems Mouse with Pop-Up Menus & PC Paint | £125.00 |
| Microsoft Bus Mouse | £135.00 |
| Summa Mouse with Gem Collection | £189.00 |

## MONITORS

| | |
|---|---|
| Dyneer 12in 12MHI Mono Monitor with Tilt/Swivel Stand | £100.00 |
| Taxon K16SV860 16in Ultra High EGA Colour Monitor | £699.00 |
| Taxon K12SV3 Supervision III Colour Monitor | £359.00 |
| Eizo ER8030M 14in High Resolution Colour Monitor | £319.00 |
| Eizo ER8042S 14in Ultra-High Res EGA Colour Monitor | £465.00 |
| ADI 14in Mono Monitor with Tilt/Swivel Stand | £120.00 |

## IBM-COMPATIBLE SOFTWARE TOP 21

| | |
|---|---|
| Wordstar 2000 release 2 | £231.00 |
| Delta 4 | £295.00 |
| Dbase III Plus | £335.00 |
| Framework II VER 1.1 | £313.00 |
| Lotus 1-2-3 ver 2.1 | £229.00 |
| Supercalc ver 4 | £197.00 |
| Smart System | £365.00 |
| Word Perfect ver 4.2 | £249.00 |
| Microsoft Word ver 3 | £280.00 |
| Multimate ver 3.31 | £207.00 |
| Executive Systems X-Tree (Super Friendly HD Organizer) | £34.00 |
| Pegasus Account per Module | £199.00 |
| Psion Chess | £30.00 |
| Quaid Software Copywrite (Back up Protected Software) | £39.00 |
| Lotus Symphony ver 1.1 | £333.00 |
| Javelin 352 MicroPro WordStar ver 4 | call! |
| Microsoft Flight Simulator | £39.00 |
| Funk Software Sideways | £40.00 |
| Borland Turbo Lightening | £55.00 |
| Microsoft Windows | £59.00 |

## TOP 22 LOW-COST AMSTRAD COMPATIBLE SOFTWARE

| | |
|---|---|
| VP Planner by Paperback Software | £75.00 |
| VP Info (dBASE II Clone) | £75.00 |
| Borland Sidekick - The Original Co-Resident Process! | £49.00 |
| Gem Collection | £99.00 |
| Sage Bookeeper | £85.00 |
| Sage Retrive Database | £85.00 |
| Sage PC Planner Spreadsheet (Lotus Clone) | £85.00 |
| Sage Desk-Set | £59.00 |
| Sage PC-Write Word Processor | £85.00 |
| Sage Accountant | £127.00 |
| Sage Accountant Plus | £160.00 |
| Sage Payroll | £85.00 |
| Sage Financial Controller - Just reduced from £995! | £250.00 |
| Personal Word Perfect | £149.00 |
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| Microsoft Word Junior | £62.00 |
| Amstrad WordStar 1512 | £62.00 |
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# SOLIDISK MASTE

If you want to upgrade your BBC B to a Master, why not use our MASTERPLAN? We buy in your Beeb and sell you a brand new MASTER: you pay only the difference.
Fill in the blanks below to help you cost the project:

Acorn Master 128K, brand new cost 499.00

BBC Model B, issue ..........., trade-in worth (issue 2 = £131, 3 = £191, 4 = £187, 7 = £225) ☐
DFS, memory and other add-ons, trade-in (We accept only Solidisk and Acorn add-ons Reging for valuation) ☐
Total cost of MASTERPLAN project ☐

## Masterising

If you are not yet ready to upgrade to a Master, why not Masterise? All you have to do is add Shadow Ram, Sideways Ram, the Real Time Clock and ADFS disk filing system — all available from Solidisk at good prices. You do not have to purchase them all of course, and they will not turn your Beeb into a Master (no numeric keypad or Rom slot, for example), but all the essential features are there and the solution could be well worth your while.

Real time Clock, Yes: £29, No: nil ☐

1770-DDFS plus ADFS, Yes: £55, No: nil ☐

DFDC plus ADFS, Yes: £60.00, No: nil ☐

(Twomeg) 128K RAM, Yes: £60.00, No: nil (other options include Twomeg 32, Twomeg 256, Fourmeg 32 and Fourmeg 256) ☐
Total cost of MASTERISING project ☐

## Solidisk Real Time Clock:

The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the Beeb with absolutely no other connection to make. It is powered by a rechargeable NICAD battery which should keep the RTC active throughout the Summer holidays.
Star commands include: Alarm, Bell, Boot, Configure, Dalarm, Noclock, Roms, RTC, Settime, Show, Status, Time and Unplug. FX161 and 162, Osword 14 and 15 are similar to the Master 128. It is also compatible with Basic 4's TIME$.
The RTC has many of the autoconfigure features of the MASTER with the same command syntax: Caps/Nocaps, data, delay, Fdrive, File, Ignore, Lang, Loud/Quiet, Mode (0-135), Boot/Noboot, Dir/Nodir, Time/Notime, Printer, Repeat, Rx, Scroll, Tube, Tv, Tx. If your Beeb has an AMX mouse, the RTC offers a DESKTOP and a CALCULATOR, just like GEM!
*Order as RTC ............................................................ £29.00*

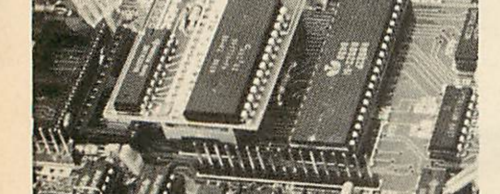
## Solidisk Dual Density Disc Systems:

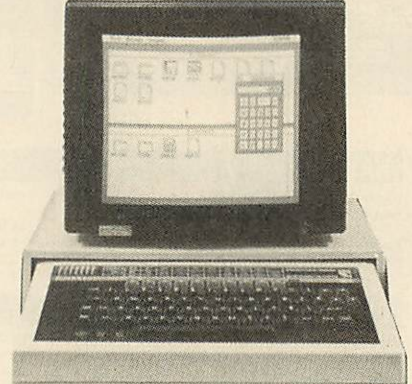
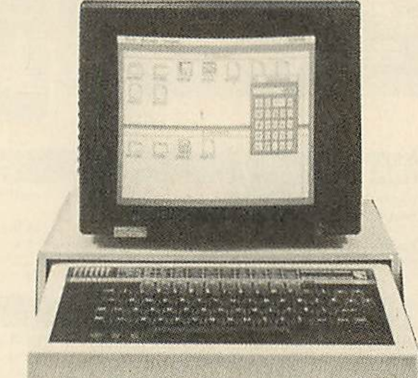
Solidisk offers two types of disk filing system, with a choice of two Rom types. Both are based on the Western Digital WD1770 chip — the standard not only for the BBC model B, but also the BBC +, Master, Compact and ADFS. Both are fully compatible with Acorn Roms, offering complete solutions to the problems of updating the BBC, based on 1770, 8271, DFS and ADFS systems.
Not only is our range therefore unequalled, but also the features it offers; if you don't believe us, check other makes before you buy.

## Which DFS?

## WD-1770 DDFS Disk Interface:

If your Beeb has not yet been upgraded to disc, then the DDFS is the right choice. It is certainly the most popular version on the Beeb and easy to fit. Use with Acorn or Solidisk Roms to give compatibility with any 40/80 track drive, with or without PSU.
*New low price without Rom ............................................ £35.00*
*With STL 2.2 ROM (see below) ......................................... £45.00*
*With STL 2.1 ROMs (see below) ........................................ £55.00*



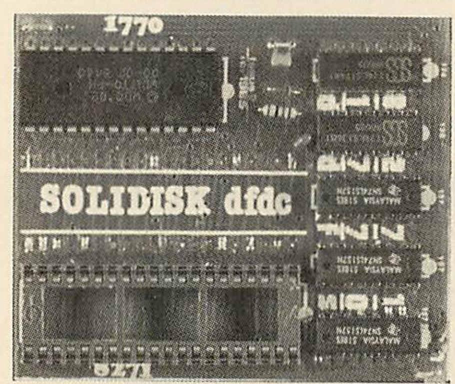



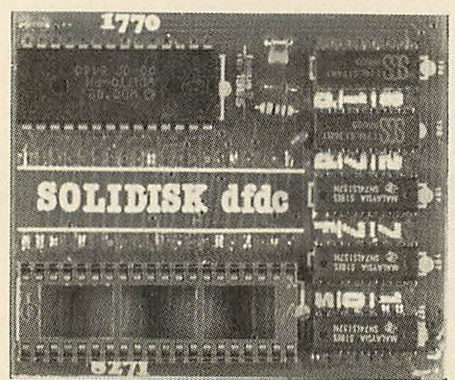
BEEB Model B

## WD-1770+8271 DFDC Disk Interface:

If you already have an 8271 based DFS from Acorn, Watford Electronics, Pace, Cumana or Viglen, this is the only way to add the WD-1770 to your system. Fully compatible with the Acorn DNFS1.20 ROM for the 8271 and Acorn ADFS for the 1770. Allows the Acorn chip set to self-erase, keeping memory requirements (and PAGE) at a minimum. For maximum performance, use the STL 2.2 Rom (for both 8271 and 1770). If ADFS is required, use Acorn DNFS1.20 ROM (for your 8271) with the STL 2.1 Romset (for the WD-1770). The last combination will still allow self erasure, and will add single and double density, cross format file copy, ADFS as well as NFS. In other words, everything imaginable with the Beeb.

*New low cost DFDC without Rom ...................................... £40.00*
*DFDC with STL 2.2 Rom .................................................. £50.00*
*Special offers:*
*DFDC with STL ADFS 2.1 Romset (see below) ........... £55.00*
*DFDC with STL 2.2 DFS and 2.1 (3 Roms) .................. £63.00*



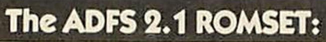



## Which ROMs from Solidisk?

## STL DFS 2.2 ROM:

Runs with both 8271 and WD-1770 chips from Acorn, Watford and Opus, and 1770 from STL, and offers the following features:
★ 40/80 track software switching ★ unlimited catalogue entries ★ automatic Read after Write for media security ★ runs with Z80, 6502 and Econet ★ more commands than any other DFS including FORMAT in 40/80 track, VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK, DSTEP, ETC ★ when used with the WD-1770, reads disks in single and double density and IBM format ★ 60 per cent free extra storage space in double density (640K per disk compared with Acorn's 400K) ★ more speed and bigger file size.
Supplied on one 16K Rom with manual
*Order as the DFSR2 ........................................................ £20.00*

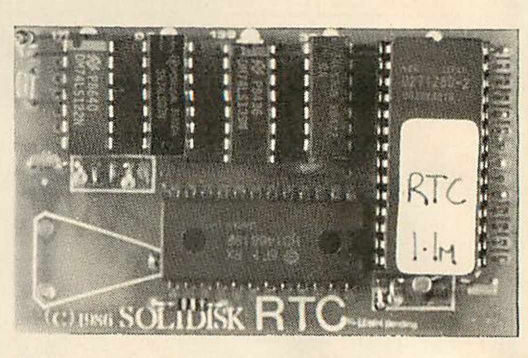
**PLEASE SPECIFY WE/OPUS/MASTER/COMPACT as applicable.**



## The ADFS 2.1 ROMSET:

This double ROM set has all the commands of the STL DFS 2.2. Rom but runs ony with the 1770, not the 8271 system. It has many more besides, including all the commands in the Acorn ADFS Rom.
PLUS: ADFS disk formatter (for 40, 80 and 160 tracks) and VERIFY ★ MVADFS and MVDFS to transfer cross format disks between DFS and ADFS with automatic PAUSE for disk change when using a single drive ★ user specified (1 to 10) number of file channels to keep PAGE to a minimum ★ runs with the Z80, Turbo, 32016 and the new 80186 PC compatible upgrade.
Supplied on two 16K Roms or one 32K with two user manuals
*Order as ADFSROM 2.1 .................................................. £30.00*

**PLEASE SPECIFY WE/OPUS/MASTER/COMPACT/16K OR 32K as applicable.**

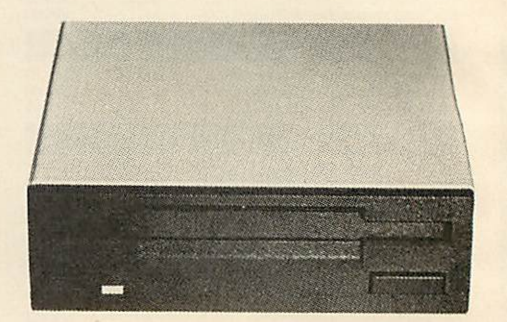



Real Time Clock

## Solidisk FD35 3.5″ Disc Drive:

This is a superb 80 track, double sided, dual density drive, also useable on the ATARI ST. You get up to 640K maximum per disc (800K with the 80186) and at its price, you are guaranteed of extremely good value. Comes with demo disk.

*Order as FD35, single drive ............................................ £100.00*
*Order as TFD35, twin drive ............................................. £200.00*
*Order as ADFS16 for the Compact ..................................... £113.85*
*Separate PSU if required (PSU/35) ..................................... £25.00*
*Recommended media:*
*Sony Double Sided, double density, 135 TPI or equivalent (£29 per box of 10).*



## Solidisk FD525 5.25″ Disc Drive:

This is a superb 80 track, double sided, dual density drive and very fast. You get up to 640K maximum per disc (800K with the 80186 board), 40/80 manual switch is optional as most Acorn DFS ROMs and Solidisk's have automatic 40/80 track software switch.

*Order as DF525, single ................................................... £119.00*
*Order as TFD525, twin in a bridge .................................... £228.00*
*Orders as TFD525/CPU, twin in the CPU case with detachable keyboard case for Beeb ........................................................ £239.00*
*Separate PSU if required (PSU/525) ..................................... £25.00*
*40/80 track manual switch optional ...................................... £2.00*

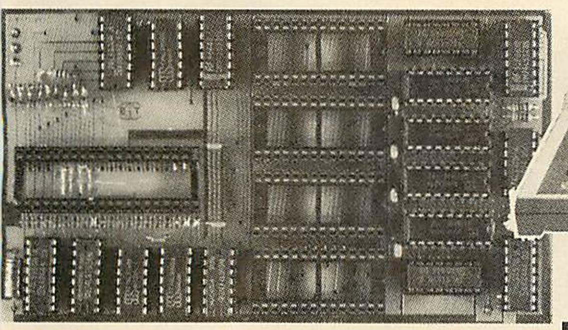
**PLEASE SPECIFY SWITCH/MASTER/COMPACT/ ELECTRON if applicable.**



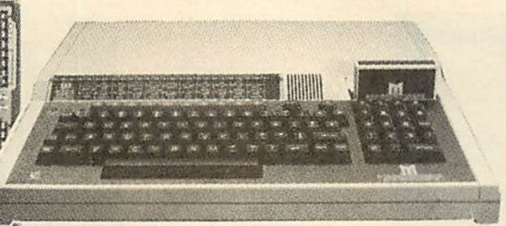
**SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).**

# RISE YOUR BEEB!



TWOMEG 128



MASTER 128

## New: The Twomeg 128K board

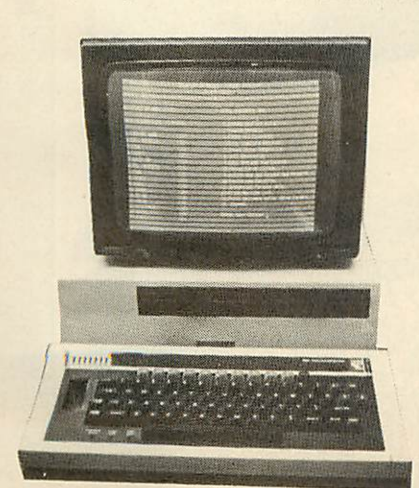
Solidisk has always been closest to emulate the MASTER 128K. The Twomeg 128K features 64K of Sideways RAM in four banks: 4, 5, 6 and 7, selected by a single latch at &FE30 for both read and write exactly like the Master. The remaining 64K is more versatile and can be used as four more Sideways RAM (12, 13, 14 and 15) or as Shadow RAM and a 24K printer buffer (good news for wordprocessor users).

The new Twomeg 128K will run Computer Concepts Interword, Sheet and Spellmaster, Acorn View 3.1, Viewsheet, Viewstore, Basic etc.
A clever switch write-protects only the 8 banks of Sideways RAM without affecting the Shadow RAM and the Printer Buffer.
Ramdisk is not forgotten, you can have one in ADFS (if you have Solidisk ADFS) or in DFS for both 8271 and 1770 disc controllers.
Four extra ROM sockets are available directly on the Twomeg 128K board, numbered 8, 9, 10 and 11. Four ROM sockets on the Beeb are renumbered to 0, 1, 2 and 3.
Software is supplied on FIVE discs, containing Wordprocessor, Spelling Checker, Database, Macro Basic, Ramdisk, Menu, Manager etc. Software Pack 2 (five discs) is optional and contains many useful utilities for the machine code programmer. Software Pack 3 also optional, contains around 50 of Solidisk Megagames. List of all programs in these software packs is included in the Twomeg 128K User Manual.
Fitting is extremely easy: just plug in the board into the CPU socket and push 3 terminals onto S20, S21 and S22. Internal logic produces chip select for the &FE30 latch. Free installation by local experts is available.
*Order as 2MEG128 .................... £60.00*

**PLEASE SPECIFY /40 TRACK OR /80 TRACK FOR THE SOFTWARE PACK 1, included in the price.**
*Optional software Pack 2 or 3 (five discs) .................... £10.00*

## Detachable Keyboard and CPU case:

This 'three box' casing system will help you to organise your desk and improve comfort. The keyboard features the lowest profile (maximum height of any key is 47mm) and does not skid. Typing angle is 2-3 degrees better. The monitor sits on top of the computer. Pure metal construction provides EMF shielding against phantom keyboard interrupt and accelerates heat dissipation (no messy metal strengthening over plastic). Keyboard lead is 24" long.
*Order as K/CPU case, special offer price while stocks last .................... £25.00*
*Note:*
*Post and packing .................... £6.00*



## The Fourmeg 32K board:

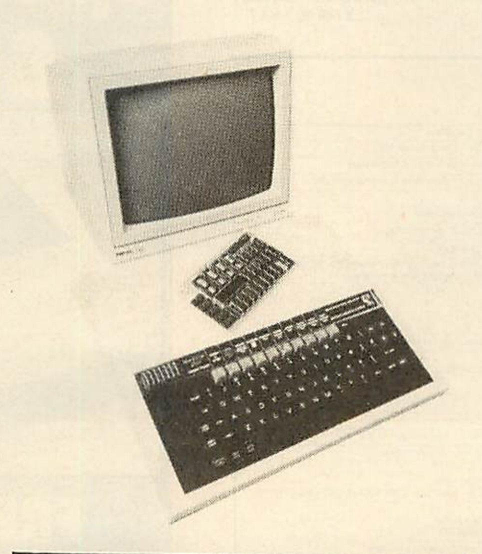
The Fourmeg 32 is a ROM expansion board on its own with up to 224K of installable firmware. It also is the FASTEST shadow RAM board around (it runs at 4 MHz while others run at 2 MHz, including the MASTER), and the fastest Sideways RAM board. It consumes also less power than any other ROM RAM board through the extensive use of CMOS devices.
The top row of five ROM sockets will take software ROMs, up to 32K each, such as used on the Beeb Plus, the MASTER or the Compact. They are high speed sockets.
The middle row contains 40K of high speed CMOS static RAM chips, acting as a Shadow RAM and a printer buffer or as two banks of Sideways RAM. Write-protection of Sideways RAM is performed by separate Read and Write registers with automatic write-protect when one presses the BREAK key.
The CPU is a 4 MHz, CMOS technology, GTE 65C02, similar to the one on the Turbo board, replacing the existing 6502.
The Fourmeg 32K is also upgradable, once more by the latest CMOS technology: 62256, 32k RAM on a single chip which plugs into one of the high speed ROM sockets.

This board is designed such that one can have everything required on a single, compact and easy to install unit. All the necessary software is in a MANAGER ROM (supplied). Star commands include: Shadow, Ramdisk, Ramoff, Ramdfs, Ramadfs, Ramdrive, Testram, Plus. A complete toolkit to assist programming in Basic is also included: Hardbreak, Join, Keyload, Keysave, Kill, Lvar, Menu, Msearch, Mzap, Page, Printer, Rcat, Number, Report, Rload, Rwipe, Salvage, Status, Sound. One year guarantee.

*Order as FOURMEG 32 .................... £70.00*
*Additional 32K chip (optional) .................... £15.00*
*Software packs 1 to 3 (optional), each of five discs .................... £10.00*

## The Fourmeg 256K board:

The Solidisk Fourmeg 256 board combines high CPU speed (4MHz GTE 65C02) with large memor size (256K Dynamic RAM, 8K static RAM) and powerful supporting software (32K MANAGER ROM). It offers four ROM sockets featuring high speed and high capacity (up to 64K ROM per socket), 8 shadow RAM banks, 8 Sideways RAM banks or even both.
*Order as Fourmeg 256K .................... £135.00*
**NOTE: NO MORE ROM BOARD TRADE-IN IS ALLOWED AFTER 1ST MAY 87.**



## Wordwise Plus or Interword Special Deal:

If you buy Wordwise Plus or Interword together with a Twomeg or a Fourmeg board, you get extra special discount!
*Wordwise Plus (bundle only) .................... £30.00*
*Interword (bundle only) .................... £50.00*

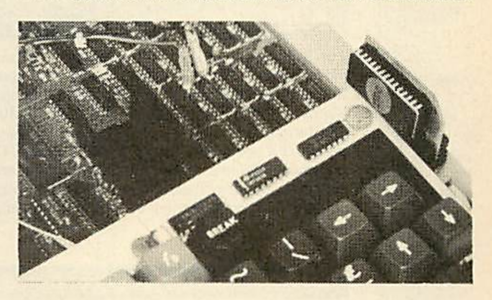
## Special Offers on Sideways RAM boards:

These exceedingly popular systems (40,000 plus units sold) enables the Beeb users to load ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play Solidisk Megagames, bigger Basic (Vstore), store music and inumerable other uses as supported by a library of 15 software diskettes.
They consist of a base unit plugging into the rightmost ROM socket on the Beeb and an exchangeable RAM card with capacity ranging from 32K (two Sideways RAM banks) to 128K (8 Sideways RAM banks). They are now made available to you at less than half their normal price, all offering extremely good value. One year guarantee, supplied with User Manual and one software disc.

*SWR32, 32K RAM, disc No 1 .................... £20.00*
*SWR64, 64K ROM and two 16/32K ROM sockets, Disc NoI .................... £30.00*
*96K Extension for SWR 32 .................... £25.00*
*SWR128 (new style), 128K RAM, two 16/32 ROM sockets .................... £45.00*
*Software Packs 1 to 3, each of five discs, any pack .................... £10.00*
*Any disc volume 1 to 15 each .................... £2.00*

**PLEASE SPECIFY /40 TRACK OR /80 TRACK as applicable.**

*Electron Disc Interface: .................... £50.00*
*BABT approved Modem plus Linemaster ROM .................... £30.00*

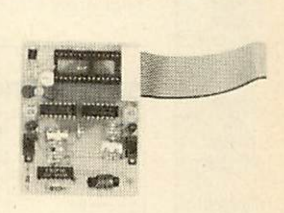


## EPROM Programmer:

The UVIPROM is the cheapest Eprom programmer on the market yet the easiest to use, will program 2764 EPROMS in one minute and 27128 in two minutes.
A different version called the UVIPROM32 will program 27256 EPROMS in 4 minutes.
The MULTIPROM is the Deluxe version, combining the capacity of the UVIPROM and the UVIPROM32 and some other features. Use it to program 2764, 27128 (normal and A type), 27256 (12.5V and 21V), 27512, 27513 etc. Textool 28 pin ZIP socket fitted as standard.

*UVIPROM plus disc No 10 .................... £20.00*
*UVIPROM32 plus disc No 10 .................... £20.00*
*MULTIPROM plus disc No 10 .................... £44.50*
*UVIPAC Eprom Eraser .................... £20.00*
*2764 EPROM each £2.00, ten for .................... £16.00*
*27128 EPROM each £4.00, ten for .................... £34.00*
*27256 EPROM each £7.00, ten for .................... £63.00*
*Panasonic KX-P1081 Special Offer: .................... £149.00 + VAT*



## IMPORTANT NOTICE: TRADE-UP

Solidisk will accept return of memory boards up to ONE YEAR old for TRADING-UP. The selling price (below) is the price we sell the same goods at the time of the trade-up transaction.

| Age | Trade-up allowance |
|---|---|
| Up to 3 months | 90% of selling price |
| Up to 6 months | 85% of selling price |
| Up to 9 months | 80% of selling price |
| Up to 12 months | 75% of selling price |

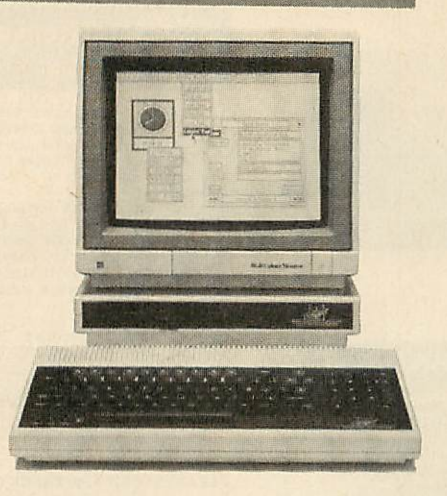
If the balance of the upgrade is less than £15, a minimum charge of 15 is made.

*****************************************
As a result of our MASTERPLAN, we have a number of BBC Model B's for sale every day. All are fully inspected, reconditioned if necessary, and guaranteed. All have a new DDFS fitted as standard. We also buy second-hand Beeb for cash. See our price list for details.
*****************************************

**SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).**

NEW BRANCH IN BRISTOL · OFFICIAL DEALER IN AVON

# System One



## System One: COMPACT now with 5.25" drives:

The System One consists of a Master Compact 128K, twin disc drives, optional monochrome or colour monitor, optional printer. Solidisk will give you free our own CDFS 2.1 ROM, a Dual Density Beeb Disc Filing System featuring disc sector editor (for both DFS and ADFS discs), MVDFS and MVADFS for cross format file transfer, disc formatter and verifier etc. Some of the options include 5.25" drive(s) which we believe is a better choice than the 3.5" format. The 5.25" format is still preferred for the Master 128 (even now, with 80186 board) and on the Beeb. Cheap discs, better reliability, better software availability are some of the key advantages. Don't buy single drive systems because you can't make copy ADFS discs with a single drive.

### Available options (all prices include VAT):

A — Compact 128K with Acorn 14" Colour monitor, CDFS, twin 3.5" drive, one demo disc containing Solidisk Database, Spelling Checker and Megagames (as illustrated): ........ *£749.00*
B — as above but with one 3.5" drive and one 3.5" drive and one 5.25" drive: *£748.00*
C — as above but with twin 5.25" drives in a bridge unit: ........ *£759.00*

### Monochrome Option:

All systems above (A, B or C) can be supplied with Acorn 12" monochrome monitor in place of the Colour monitor:-
A ........ *£598.00*
B ........ *£597.00*
C ........ *£608.00*

### P-1081 Printer option: £171.45

Buy the Panasonic KX.P1081 NLQ/Super NLQ printer with a System One. At £171.45, you just can't afford to let this latest Japanese printer go. Special reduced price at only ........ *£149.00 + VAT.*

### SPECIFICATIONS

| | |
|---|---|
| Print Method | Impact Dot Matrix |
| Print Speed (cps) | Draft 120 NLQ 24 Compressed 102 |
| Print Mode Selector | Standard/Program, Near-letter quality, Compressed |
| Print Direction | Bi-directional with logic seeking (Uni-directional in bit image mode) |
| Print Head | 9 pin |
| Print Head Life | 100 million characters |
| Line Spacing | 1/6", 1/8", 7/72", n/72", n/216" (programmable) |
| Line Feed Speed | 100 ms (per 1/6") |
| Character Set | Full 96 ASCII characters with descenders, Italic, 32 International characters (11 Countries), IBM® special characters, IBM block graphics |
| Character Structure<br>Draft<br>NLQ<br>Block graphics | HOR × VERT<br>9 × 9<br>18 × 18<br>6 × 12 |
| Bit Images (Dots/inch) | 60, 72, 80, 90, 120, 240 (120 can be used in standard or double speed) |
| Paper Feed | Adjustable rear tractor feed and friction feed |
| Paper Width | Fanfold paper: 3" to 10" Single sheet: 4" to 9" |
| Number of Copies | 3 (Original plus 2 non-carbon copies) |
| Interfaces<br>Standard<br>Optional | <br>8 bit parallel<br>RS-232C (DTR, X-ON/X-OFF or ETX/ACK···KX-P11D, DTR, X-ON/X-OFF···KX-P17) |
| Buffer<br>Standard<br>Optional | <br>1 K text buffer<br>4 K text buffer (KX-P12) |
| Compatibility | RX-80™, IBM Matrix and Graphics Printers (Elite Pitch command of the Proprinter is also available.) |
| Noise Level | 60 dbA |
| Reliability | MTBF 4000 hours at 25% duty (not including head life) |
| Environmental Conditions (Controlled) | Operating 41°F to 104°F (5°C to 40°C)/20 to 80% humidity<br>Storage -4°F to 140°F (−20°C to 60°C)/10 to 90% humidity |
| Power Requirement | 240 V AC ±10% 50 Hz 0.6 AMP |
| Dimensions (W×D×H) | 15.9" (403 mm) × 11.3" (286 mm) × 4.5" (115 mm) |
| Weight | 13.4 lbs. (6.1 kg) |
| Other Options | Color ribbons: Brown (KX-P111), Blue (KX-P112), Red (KX-P113) |

Printing Sizes:

| | Characters per inch: Pica | Elite | Semi-Comp | Comp | Characters per line: Pica | Elite | Semi-Comp | Comp |
|---|---|---|---|---|---|---|---|---|
| Draft/NLQ | 10 | 12 | 15 | 17.1 | 80 | 96 | 120 | 137 |
| Double width | 5 | 6 | 7.5 | 8.5 | 40 | 48 | 60 | 68 |
| Proportional Spacing | Variable | | | | Variable | | | |

*RX-80 is a trademark of Epson America, Inc.
*IBM is a registered trademark of International Business Machines Corp.

# System Two



## System Two: MASTER 12K with Twin 5.25" Drives in a Bridge Unit:

This system is our most popular, consisting of a fully blown MASTER 128K, twin 80 track, double sided 1.3 Megabyte Disc Drives in a bridge unit doubling as a monitor stand, free demo disc containing Solidisk Database, Spelling Checker and Megagames.

**Available options (all prices include VAT):**
A — As illustrated (without monitor) ........ *£670.00*
B — with Philips 14" CM 8533 colour monitor (same construction as Acorn colour monitor) ........ *£865.00*
C — with Mitsubishi 14" XC 1404 colour monitor ........ *£830.00*

**Special offers (if bought together with a System Two):**
MP-165 ........ *£220.00*
P-1081 ........ *£171.45*
Master 80186, 512K Co-processor ........ *£223.00*
Acorn 20 MB Winchester ........ *POA*
Solidisk 20 MB Winchester (special issue, only with 80186 option) ........ *£500.00*

### MP-165 Printer option: £220.00

The MP 165 is one of our best selling printers, featuring 165 cps in draft mode, 40-50 cps in NLQ, Epson FX compatibility, friction and tractor feed etc. Normal price is extremely attractive at £260.00 when you consider that the MP 165 is a lot faster than its rivals such as the Star NL-10, the Kaga KP-810, the EPSON LX86 or FX85 etc. We will cut £40 off the normal price and give you a free printer lead if you buy the MP-165 together with a System.




SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

## MASTER SERIES:

| | | |
|---|---|---|
| AMB15 | Master 128 | 499.00 |
| ADB12 | Master ET | 399.00 |
| ADC06 | Turbo Upgrade | 125 |
| ADC08 | 80126/512K | 228.00 |
| ADF13 | Eprom cartridge | 14.95 |

## MANUALS AND DOCUMENTATION:

| | | |
|---|---|---|
| ADJ22 | Ref manual Pt 1 | 14.95 |
| ADJ23 | Ref manual Pt 2 | 14.95 |

## MASTER COMPACT SERIES:

| | | |
|---|---|---|
| ADB20 | Master Compact Single drive | 441.25 |
| ADB20+ADF30 | Master Compact S/D with TV mod. | 457.35 |
| ADB20+ADF31 | Master Compact S/D with Mono monitor | 537.85 |
| ADB20+ADF32 | Master Compact S/D with Colour monitor | 687.35 |
| ADF15 | RS232 kit | 29.90 |
| ADF16 | Second 3.5" floppy drive | 113.85 |
| ADF17 | PAL TV Adaptor | 29.90 |

## ACORN SOFTWARE:

| | | |
|---|---|---|
| SUB27 | Viewstore database ROM | 59.80 |
| SUB18 | Pascal | 69.00 |
| | FORTH | 19.90 |
| | LISP | 19.90 |
| | MICRO-PROLOG | 79.95 |

## SOLIDISK SOFTWARE ROMS:

| | | |
|---|---|---|
| PCFS | Compatible with PC and MS DOS discs | 15.00 |
| PCMAN | MANUAL FOR PCFS | 5.00 |
| CDFS | single and double density DFS ROM for the COMPACT | 10.00 |
| MADFS | DFS and ADFS ROM (32k) for the Master | 20.00 |
| LMS | communication ROM for the Master | 10.00 |
| SOLIMON | Machine code monitor for Master/Compact | 10.00 |
| INSIGHT | Intelligent disassembler, XREF | 20.00 |
| UVP | Eprom programmer software (8k) | 5.00 |

## ECONET PRODUCTS:

| | | |
|---|---|---|
| ADF10 | Econet plug-in | 49.99 |
| AEH17 | 100m Cable | 99.00 |
| AEH18 | 10station lead set | 29.00 |
| AEH19 | Econet starter kit | 99.00 |
| AEH20 | Econet bridge | 199.00 |
| AEH21 | Econet socket kit | 29.95 |
| AES21 | Level 2 Fileserver | 249.00 |
| AES22 | Printer server ROM | 49.00 |

## DISC DRIVES:

| | | |
|---|---|---|
| FD35 | 3.5" 80-track double-sided single drive | £100.00 |
| TWIN35 | Twin DF35 | £200.00 |
| FD525 | 5.25" 80-track double-sided single drive | £115.00 |
| TWIN525 | Twin FD525 | £230.00 |
| 20MB | Winchester new model, low cost SEAGATE | £700.00 |

## PRINTERS:

| | | |
|---|---|---|
| LX86 | EPSON LX86 + 2M printer lead | 249.00 |
| LXTF | LX80 Tractor Feed | 31.30 |
| LXCSF | LX80 Cut Sheet Feeder | 53.53 |
| FX85 | EPSON FX85 NLQ + 2M printer lead | 350.00 |
| FXTF | FX85 Tractor Feed | 30.59 |
| FXCSF | FX85 Cut Sheet Feeder | 123.50 |
| NL10 | STAR 80 col-120 cps par. 2M lead | 289.00 |
| NLCSF | Cut Sheet Feeder for NL-10 | 59.99 |
| NLRIB | Black Ribbon for NL 10 | 5.64 |
| MP165 | Tractor and pich feed, 165 cps, NLQ, 2M printer lead, exceptional value | 260.00 |
| EPSRIB | Black ribbon for Epson and MP165 | 4.00 |
| J6100 | JUKI 6100 Daisy Wheel + 2M printer lead | 340.00 |
| JURIB | JUKI 6100 black vinyl printer ribbon | 2.00 |
| PAPER | 2000 sheets cont. paper, A4 size 11" x 9.5" | 14.00 |

## MONITORS:

| | | |
|---|---|---|
| BM7502 | 12" Philips hi-res green screen, lead | 85.00 |
| BM7522 | 12" Philips hi-res amber screen, lead | 86.00 |
| CM8533 | 14" hi-res Colour Monitor, lead | 299.00 |
| TAXAN3 | 12" TAXAN Supervision 3, hi-res RGB Colour, lead | 375.00 |
| TAXAN2 | 12" TAXAN Supervision 2, Merdium-res RGB Colour monitor, lead | 315.00 |
| XC1404 | 14" Mitsubishi RGB colour monitor, lead | 260.00 |

## SOFTWARE PACKS:

| | | |
|---|---|---|
| SWPK1 | 5 software discs, 80 track. Database, spelling checker, machine code monitor, Macro Basic etc. 5.25" format | £10.00 |
| | 3.5" format | £15.00 |
| SWPK2 | 5 software discs, 80 track. Games. 5.25" format | £10.00 |
| | 3.5" format | £15.00 |

## DISKETTES:

| | | |
|---|---|---|
| MD525 | 5¼" low cost VEREX for all drives | .12.00 |
| MD557 | 5¼" hi-rel MD557, Verbatim DSDD 96tpi | 25.00 |
| C102 | 3.5" low cost Verbatim for all drives | 20.00 |
| C103 | 3.5" hi-rel 90097M Vertbatim DSDD 135 tpi | 28.00 |
| C104 | 3" CF2/MSOFT for all Amstrad drives | 39.00 |

## CARTRIDGES:

| | | |
|---|---|---|
| ADF13 | Acorn Eprom cartridge for two 27128 | 14.95 |
| EPR32 | Solidisk Eprom cartridge for one 27256 | 8.00 |
| RAM32 | Solidisk 32K RAM cartridge with battery backup and write protect switch | 25.00 |
| MEGA256 | Solidisk 256K Mega-RAM card with RAM disc and printer buffer in ROM | 100.00 |
| MEGA256 | Solidisk 1 Megabyte Mega-RAM card with RAM disc and printer buffer in ROM | POA |
| | Expected price in April/May | 225.00 |

## EXTRA DISCOUNT

If you buy a disc drive or a printer or a monitor at the same time you buy a Master or a Compact, you are qualified for SYSTEM DISCOUNT and a free Software Pack 1 (worth £10.00 or more).

| Normal Package Price | System Discount | Reduction |
|---|---|---|
| £600-£699 | 3% | £18-£21 |
| £700-£799 | 4% | £28-£32 |
| £800-£899 | 5% | £40-£45 |
| £900-£999 | 6% | £54-£60 |
| £1000 and above | 7% | £70-£££ |

| Example of system | | normal price | Discount | Net price |
|---|---|---|---|---|
| 1 | Compact Mono + MP165 printer | 797.85 | 31.95 | 765.94 |
| 2 | Compact Colour + Juki 6100 | 1027.35 | 71.89 | 955.11 |
| 3 | Master 128 + twin F/Drives | 729.00 | 29.16 | 699.84 |
| 4 | Master 128, twin F/Drives, CM8533 Colour monitor | 1028.00 | 71.96 | 956.04 |
| 5 | example 4 + MP165 printer | 1288.00 | 90.15 | 1197-84 |
| 6 | Master 512 + twin F/Drives | 957.00 | 57.42 | 899.58 |
| 7 | Master 512 + twin F/Drives, plus 20 MB Winchester | 1657.00 | 115.99 | 1541.01 |

## SECONDHAND BEEB AND UPGRADE TO MASTER:

We buy and sell good condition second hand Beebs, even by post. Proof of original purchase is required if you are only selling your computer. Reduced commission is available if you are UPGRADING your BBC to a Master, ask for a MASTERPLAN quotation.

| BBC Model | we buy at | we sell at |
|---|---|---|
| B-issue 2 | 131 | 175 |
| B-issue 3 | 191 | 225 |
| B-issue 4 | 187 | 250 |
| B-issue 7 | 225 | 300 |

The prices above are given as average for very clean and good condition machines. Please ring for stock allocation before you call.

## ORDERING BY POST:

All items can be ordered by post, sending the coupon below and enclosing cheques, POs, drafts or credit card numbers or by phone. P and P is charged as follows:
Less than 1 KG (eg software, cartridges and books): **£2.00**
Up to 3 KGs (eg single disc drives): **£3.00**
Up to 10 KGs (eg computer, monitors, printers, twin disc drives): you can specify either parcel post £6.00 or courrier/Datapost: **£12.00.**
Above 10KGs (eg complete system), please either allow generously or give us a ring for quotation.

## ORDER FORM

**Please fill and send to:**
**Solidisk Technology Ltd**
**17 Sweyne Avenue**
**Southend-on-Sea, Essex SS2 6JQ**

Name: ........................................
Address: ........................................
........................................
........................................
Items: ........................................
Price: ........................................ P & P: £2/£3/£6/£12
Total: ........................................
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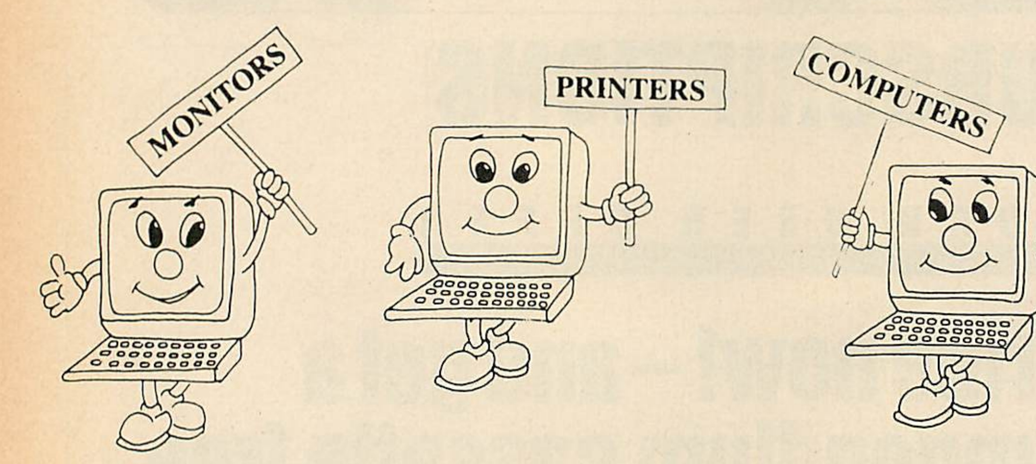

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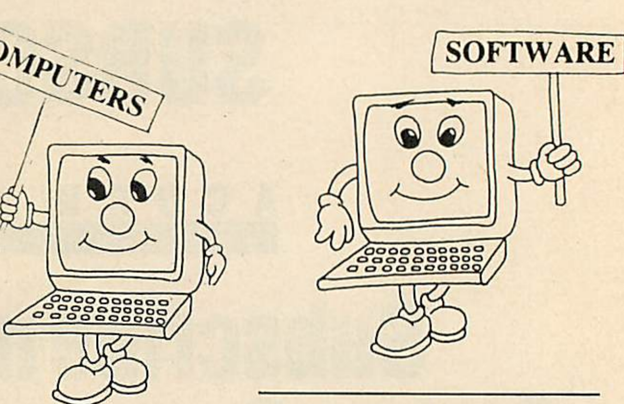


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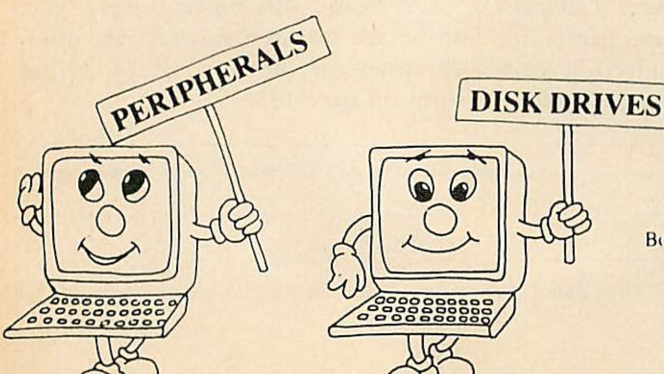



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**Bristol.** Format 40/80 Club: BBC Disc User Group, Peter Hughes, 5 Marsh Street, Bristol BS1 4AA
Tel: (0272) 799979
**Fareham.** Porchester & Fareham Computer Club: Simon Ward, 9a East Cams Close, Downend, Fareham, Hants PO16 8RP
**Gosport.** Borough of Gosport BBC Users Group (BOGBUG): Graham Dubber, 128 Wych Lane, Gosport, Hants PO13 0TE
Tel: (0329) 282221 (evenings)
**Radio.** AMRAC (Amateur Radio and Computers): Mr T Triggel, Gleness, East Boldre, Brockenhurst, Hants SO42 7WD
Tel: (0590) 612130

## MIDLANDS & ANGLIA

**Boston.** Boston Acorn Computer Users Club: J C Goodwin, 245 Church Green Road, Fishloft, Boston, Lincs PE21 0RP
**Burton-on-Trent.** Beeb Users' Group (Bug Club): Mrs Linda Yeomans, 13 Regent Street, Church Gresley, Burton-on-Trent, Staffs DE11 9PL
Tel: (0283) 216445 (eves)
**Cambridge.** Bottisham Acorn User Group: Peter Rank,
Tel: Cambridge 812080, or Gerald Wilcockson, 19 Gallows Hill, Saffron Walden, Essex CB11 4DA
Tel: Saffron Walden 23793
**Derby.** The Derby Microcomputer Society: F Taylor, Secretary, c/o 5 Park View Close, Allestree, Derby DE3 2GH
Tel: Derby 559334
**Dudley.** Kingswinford BBC Micro Club: Kingswinford Community Centre, High Street, Kingswinford, Dudley, West Midlands
Tel: Dudley 212538
**Glossop.** Glossop Computer Club (Derbyshire): T S Fox, 4 Park Lane, Little Hayfield, Stockport, Cheshire SK12 5NW
Tel: (0663) 44260
**Huntingdon.** RAF Personal Computer Association: Sqn Ldr J A Upham, Man S (ADP), HQ RAFSC, RAF Brampton, Huntingdon PE18 8QL
**Norwich.** Amateur Computer Club: Andy Leeder, Church Farm, Stratton St Michael, Norwich NR15 2QB
**Norwich.** Norwich & District BBC Microcomputer User Group: Roy Street, Church Farmhouse, Themelthorpe, Dareham, Norfolk NR20 5PS
Tel: Foulsham 579
**Nottingham.** Micro Club: John Day, 8 Warkton Close, Chilwell, Notts NG9 5FR
Tel: (0602) 225660. Prestel: 602225660
**Redditch.** Redditch Computer Club: Anthony Green, 14 Radway Close, Redditch, Worcs B98 8RZ
Tel: (0527) 61434
**Stoke.** POTBUG BBC User Group: J Forest, 50 Cliff Street, Smallthorne, Stoke-on-Trent, Staffs
Tel: 818430
**Stratford.** Stratford Computer Club: Chris Parry, 15 Kipling Road, Stratford-on-Avon
Tel: (0789) 68080
**Suffolk.** West Suffolk BBC Micro Users' Club: Antony Hurden, 14 Plovers Way, Bury St Edmunds, Suffolk IP33 2NJ

## NORTH-WEST

**Cheshire.** Mid-Cheshire Computer Club: Michael Christie, 496 The High Street, Winsford, Cheshire
**Cumbria.** West Cumbria User Group: P Majid, Tel: (0946) 62732 or K Purkiss, Tel: (0946) 66586
**Liverpool.** Mersey BBC User Group: Nik Kelly, 56 Queen's Drive, Liverpool L4 6SH
**Rochdale.** Rochdale BBC Micro User Group: c/o 6 Dunbar Grove, Darnhill Estate, Heywood, Lancs OL10 3QJ
**Wirral.** Wirral Micro Users Club: David Walsh, 23 The Pines, Bebington, Wirral, Merseyside L63 9PH

## NORTH-EAST

**Bridlington.** Solinet: Kenneth Hardacre, 13 St John Street, Bridlington, East Yorkshire YO16 5NL
**Huddersfield.** Huddersfield BBC Micro User Group: S Gill, 21 Mayfair Avenue, Sowood, Halifax, W. Yorks
Tel: (0422) 73058
**Hull.** Forum 80: 421 Endike Lane, Hull HU6 8AG
**Hull.** MUSE (for teachers): PO Box 43, 231/2 Friary Chambers, Whitefrairgate, Hull HU1 2HD
Tel: (0482) 20268
**Keighly.** Keighly Computer Club: Colin Price, 'Apple Garth', The Hob Hill, Steeton, Keighly, W. Yorks
Tel: (0535) 54738
**Leeds.** Garforth BBC User Group: D G Pell, 84 Park Lane, Rothwell, Leeds LS26 0EY
**Newcastle.** Newcastle & Washington BBC User Group (NEWBUG): Multi-purpose centre, Oxclose Village, Washington, Tyne & Wear
Tel: (0783) 813175 (eves)
**Northumberland.** NEBUG: Ian Douglas Chapman, 13 Pont St, Ashington, Northumberland
Tel: 0670 856273
**Sheffield.** Parsons Cross BBC User Group: Andrew Grant, 28 Rokeby Road, Sheffield S5 9FU
Tel: (0742) 461203
**S Yorks.** South Yorks Personal Computer Group: Bob Hindle, 139 Penrhyn Road, Sheffield S11 8UP
**Wakefield.** Wakefield BBC Micro User Group: PO Box 65, Wakefield, West Yorkshire WF2 6YZ

## SCOTLAND

**Econet.** User Group (Scotland): c/o Michael Ryan, Balkeerie Cottage, Eassie, by Forfar, Angus
**Central Scotland.** BBC User Group: D Davidson, 1 Roxburgh Place, Larbett, Stirlingshire FK5 4UE
Tel: (0324) 558692
**Inverclyde.** Inverclyde BBC Micro Users Club: Robert Watt, 38 Wellyard Way, Greenock, Renfrewshire PA16 0XG
Tel: Gourock 39967

## WALES

**Cardiff.** Cardiff BBC Computer Club: Geoffrey Barker, 2 Whitcliffe Drive, Penarth CF6 2RY
Tel: (0222) 701023

## N. IRELAND

**Belfast.** Belfast Computer Club: Andrew White, 19 Greenpark Drive, Markethill, Co Armagh BT60 1PX

## OVERSEAS

**Australia:** BBC Users Group of Canberra: PO Box E58, Queen Victoria Terrace, ACT 2600
**Australia.** Beebnet: M A Cowley, PO Box 262, Kingswood, South Australia 5062
**Australia.** Ozbeeb Sydney, meetings North Ryde, PO Box 1030, Parramatta 2150
Tel: day 635 4868, eve 868 4455
**Australia.** Dapto BBC User Group: PO Box 447, Dapto, NSW 2530
**Canada.** Atom Users Group of Canada: John Wood, 812 Cabot Trail, Milton, Ontario L9T 3M8
**Canary Islands (Spain).** BBC Micro Club Tenerife: PO Box 560, 3800 Santa Cruz de Tenerife
**Eire.** Irish Amateur Computer Club: Austin Vaughan, 35 Monastery Drive, Clondalkin, Dublin 22. Tel: 01-593112 (eves)
**Eire.** OIFIG (Official Irish Forth Interest Group): c/o Hugh Dobbs, Newton School, Waterford
**Finland.** Arien Raateland, Hopeatie 10A21, 00440 Helsinki 44
**France.** Club Informatique Assevent: Claude Laurent, 1 rue du Marechal Leclerc, Assevent 59600. Tel: (27) 652294
**Greece.** Microclub: C Mantazavinatos, 17 Stournara Str. 106 82 Athens
**Hong Kong.** Acorn Computer Users Society of Hong Kong: PO Box 13330, Central PO, HK
**Malaysia.** Sabah Computer User Group: c/o Albert Vun, PO Box 69, Kota Vun, Sabah, Malaysia
**Malta.** BBC Micro Users Club (Malbeeb): Ray C Zammit, 20 Oleander Avenue, Santa Lucia
**Netherlands.** Big Ben Club: J W Vuurpijl, Hein Baderstraat 36, 2171 XP Sassenheim
**New Zealand.** BBC/Acorn Computer User Group of NZ: PO Box 9592, Wellington
**New Zealand.** Christchurch BBC & Electron Users Group: Mrs Rebe Nolan, 87 Palmers Road, Christchurch 9
**Norway.** BBC INFO: Horten Ingenlorhogskole, Skippergt. 6, 3190 Horten
**Norway.** Skandinavian BBC User Group: Frans-Otto Hendriks, Ludvig Karstensvei 14, 1064 Oslo 10
**Pakistan.** BBC Users Group: Capt. Z A Kidvai. Tel: Karachi 540986
**South Africa.** Acorn Atom Users Group: J G Dowling, 27 Oribi Avenue, Van Riebeeck Park, Kempton Park 1620
**South Africa.** Pretoria BBC Users Group: Stan Miller, PO Box 117, Montana 0151
**South Africa.** Tygerberg BBC User Group (Tygerbug): R P Donavan, 16 Bakker Street, Welgemoed, Bellville 7530
**Sweden.** BBC User Group: Anders Wichman, Folkungagatan 58, 11622 Stockholm
**Sweden.** Acorn User Society of Sweden: Tord Israelson, Tuppa Klaras Vag 12, S-702 29, Orebro, Sweden
**Tasmania.** BBC Users Group (Tasbeeb): Box 25 PO, North Hobart 7002

## SPECIAL INTEREST

**Accounts.** BEEBACC: Brian Pain, 40a High Street, Stony Stratford, Milton Keynes
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**Adventure.** International Adventure Club: Simon Martin Clarke, 10 Ennis Close, Harpenden, Herts AL5 1SS
**Bulletin Boards.** Forum 80: 421 Endike Lane, Hull HU6 8AG
**CP/M.** CP/M User Group: Diana Fordred, 72 Mill Road, Hawley, Dartford, Kent
Tel: (0322) 22669
**Disc Users.** Format 40/80 Club (BBC Disc User Group): Peter Hughes, 5 Marsh Street, Bristol BS1 4AA
**Education.** Micros and Primary Education (MAPE): c/o Mrs G Jones, 76 Sudbrooke Holme Drive, Sudbrooke, Lincs LN2 2SF
**Electronics.** Alton Computer & Electronics Society: Kevin Weatherhead, Sheen, Old Odiham Road, Alton, Hants GU34 4BW
Tel: Alton 87478
**Heraldry Society.** Colin Forrester, 5 Hook Road, Epsom, Surrey KT19 8TH
**Logo.** British Logo Users Group (BLUG): Richard Olney, c/o London Technology Network, 86-100 St Pancras Way, London WC1
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**Sideways** *RAM* User Group, 13 St John Street, Bridlington, East Yorkshire YO16 5NL, send stamped addressed envelope.
**Pen-pals** wanted for BBC B/ Electron/ Master Compact owners. Send sae to Phillip Matthews, 53 Outer Circle, Coxford, Southampton, SO1 6GS.
**BBC B** disc users wanted as penpals to swap ideas, info and tips. All letters answered. No time-wasters please. Alan Brickman, c/o SUDR, BFPO 802.
**BBC** penpal wanted, disc only, to swap tips, music demos etc. Write to K Howe 6 Whitehall Gardens, Retford, Notts. DN22 6JH.
**FOR** sale Watford Electronics tape to disc transfer ROM, excellent condition, 6 months old £10. Tel: (0235) 30668.
**BBC B** C/W 40/80 DS drive, 100k single drive, Replay, mouse, Acorn Teletext Adapter, NT80 printer *WW+* etc, £450, will split. Tel: (Leeds) 691737.
**Torch** Z80 second processor +1986 update for BBC B, includes perfect software/manuals, £175. Tel: 01-673 3873.
**Epson** P-40 thermal printer, BBC lead, paper, vgc, postage included. Cost over £90, sell for £50. Tel: (0255) 420085, evenings.
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**Acorn** 6502 second processor for sale (with Hi-Basic), excellent condition, £100. Phone: Fareham (0329) 280853.
**Torch** Z80 second processor. include CP/M, perfect software/manuals, cased with independent power supply, £185. Phone Peter, 01-867 7369, (evenings).
**Video** digitiser by R H/Gladstone Electronics with PSU and excellent software, the best digi for BBC B, £185. Tel: (073 784) 4503, Tony.
**Acorn** User, all issues to date. Offers, phone (0323) 20752.
**Wanted** BBC B dual disc drive and software discs. Tel: 01-363 7114.
**BBC B** 1.2OS DFS, Akhter MD802E dual disc drive 40/80T DS, monitor, AMX Mouse, BCPL ROM, tape recorder, *Fleet St Editor*, + software, + books, £550 ono. Tel: (0392) 30271.
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**BBC B** 1.2 OS, Watford DFS, 200k, dual disc drive, *Wordwise*, toolkit, Exmon II, Macrom, £470 ono. Tel: Harrison 061-491 3135, after 8pm.
**Oric** Atmos disc drive wanted, also any hints and tips on the use of the computer and disc system. 18 Norly Grove, Billslay, Birmingham, B14 ODR.
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**Acorn** Bitstik £235, boxed, as new. Global Products P8000 Industrial EPROM programmer, £275. Tel: Paul: Derby (0332) 362798.
**32016** Acorn second processor 512k. Full software and manuals, any reasonable offers considered. Tel: Paul, (0440) 62732, after 6pm.
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# Free AU game!

Abuser is giving away a free game! It will boot any number of times, does not feature fish, or a screen designer and is not named after a logic gate. Simply type in the listing, press ‹f0› and off you go!

You should be able to guess what the aim of the game is and what the keys are. The current high score is 280 but we're sure you can do better than that.

Abuser would be very interested to see any one line games you have written. Thanks to David Lawrence for this ditty.

```
*KEYOMO.6:V.23;8202;0
;0;0;:REP.CLS:X%=20:S%=
0:REP.V.31,0,24,33,31,3
9,24,33,31,RND(38),24,4
2,11:V.31,X%,3:A%=135:V
%=(USR(&FFF4)AND&FF00)/
256:V.(1-ABSSGN(V%-32))
*86:X%=X%-(INKEY-67)+(I
NKEY-98):S%=S%+1:U.V%<>
32:V.30:P.S%:REP.U.INKE
Y-99:U.O|M
*FX138,0,128
```

Any similarity to Superior Software's new blockbuster *Syncron* (worth 'at least £7.95') is purely coincidental.

# Clive's comeback

Not content with lead-free trikes, the ecology-conscious Sir Clive Sinclair has gone one better and produced – pause for fanfare – the recycled macrobiotic computer.

Dear old Clive has finally found a use for all those unsold Acorn Z80 second processors and Spectrum rubber keyboards. He's put them in a box with a liquid crystal display screen and behold, the Z88 laptop is born.

Laptop what? Well, it's the perfect size for use as a place mat for those hot dinners in front of Coronation Street. And being rubber coated it doesn't matter if you spill some of the gravy.

At A4 size, the Z88 may come in handy on the bus – you can rest your precious copy of *AU* on it without the mag bending or slipping between your knees. Rumour has it that you could even use the Z88 as a computer.



**Z88 style smile from C5-user**

Few people have seen the machine actually in operation. Guy Hoomee, well known star of stage, screen and micro gossip columns, reports having spotted two. Alas, one turned out to made of wood and the other looked suspiciously like a BBC Master with a Z80 second processor tacked on.

A series of reports which have been variously described as unconfirmed, uninformed and almost totally apocryphal, suggest that Greenpeace is interested in the micro – but on practical rather than ethical grounds. It seems the rubber coating is useful when the spray flies over the sides of your dinghy.

Sir Clive is totally unabashed by the fact that the Z88 comes complete with BBC Basic. He's now claiming that he's always thought the language to be 'a fine and powerful tool', or words to that effect. So it would be churlish for Abuser to suggest that the main reason for the choice is that he couldn't afford to develop a new Basic of his own.

# It's a tie

We have been looking more closely at the pictures of Messrs Sinclair and Quinn on this page and noticed a shocking thing – both the whizz kids sport the same wide spotty tie. What can this mean? Is it some secret society? Are they by any chance related?

Our ace roving reporter, Orson Fact and photographer, Holly de Snappe, are investigating at this moment.

# Whodunnit mystery

Abuser is not normally nervous but strange things are afoot.

Several times a day frozen *AU* hacks close a nearby window, only to find a few minutes later that it has mysteriously opened again.

Anxious-looking sub-editors have been seen fiddling with rosaries, crucifixes, and strings of garlic, turning deathly pale as a distant voice sings short snatches of some ancient ditty. 'You ain't seen nothing like the mighty Quinn,' it intones. 'When Quinn the eskimo gets here . . .' We shudder in our thermals to think what the consequences might be.



**The ice man cometh (aka Quinn)**

# Down at Domesday

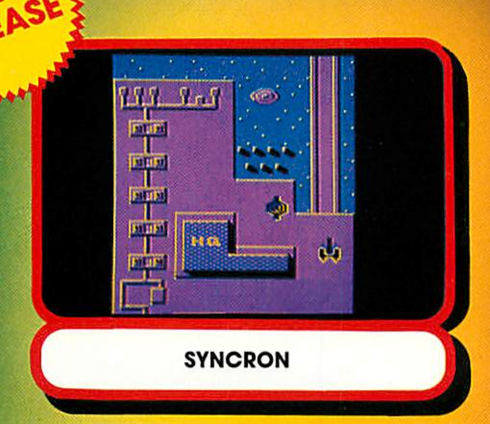
Browsing around our Domesday discs, we came across a scene described as an 'ariel' view of Stornoway. Ariel is the name of the BBC's in-house magazine. It's also a type of gazelle and soap powder.

Far be it for us to suggest the producers of the Domesday system have problems with their spelling. It's perfectly obvious the picture shows the view from some BBC offices . . . or there are herds of gazelles in the picture . . . which we can't quite see . . .

# The Superior Collection Volume 3

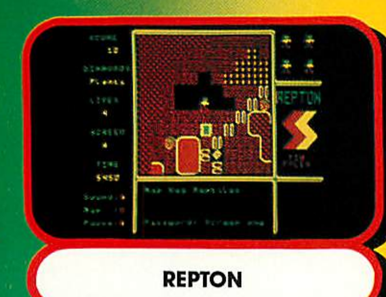
**For the Acorn Electron**

NEW RELEASE




**SYNCRON**

Voted COMPUTER GAMER'S BBC MICRO GAME OF THE YEAR 1985



**REPTON**

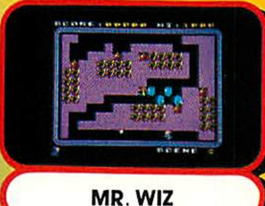
**REPTON 2**



**KARATE COMBAT**



**DEATHSTAR**



**MR. WIZ**



**SMASH AND GRAB**



**OVERDRIVE**

## A New Concept in Compilations

**The Superior Collection Volume 3** features one brand new game, Syncron, together with 7 of Superior Software's classic hits for the Acorn Electron.

**Syncron** is a fast-action game set against a backdrop of an enormous graphically-detailed scrolling landscape.
The landscape is, in total, 1024 times the size of the screen. You must endeavour to complete 16 hair-raising missions; in each mission you have to collect a number of power cylinders, land your spacecraft on a runway with each cylinder in turn, and finally locate and bomb the HQ Building. Whilst skilfully manoeuvring your spacecraft between the defence pylons and force-fields, you are attacked by alien spacecraft and missiles launched from the land bases.
A superb game, worth at least £7.95 in its own right.

| | |
|---|---|
| Acorn Electron dual cassette | **£9.95** |
| Acorn Electron 3½" disc | **£14.95** |

Here's what the computer press said about some of the other titles on this compilation package:—

**REPTON:** "This is an astounding game reaching new heights in Electron arcade adventures." . . . ELECTRON USER

**REPTON 2:** "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!" . . . ACORN USER

**DEATHSTAR:** "Deathstar is a super fast, all action arcade classic. It's the sort of game that you can't put down . . . The graphics are excellent and the scrolling is very smooth in all four directions. The pace is fast and furious even on the starting screen. This action packed game is recommended for all arcade gamers."
. . . ELECTRON USER

**SMASH AND GRAB:** "As usual with Superior products the graphics are excellent, with a good use of colour and no flicker. I expect this game will have you rolling with laughter. I certainly did.

| | |
|---|---|
| Instructions | 95% |
| Playability | 95% |
| Graphics | 100% |
| Value For Money | 100% |

Awarded ★★★★★ (Top Rating)"
. . . HOME COMPUTING WEEKLY

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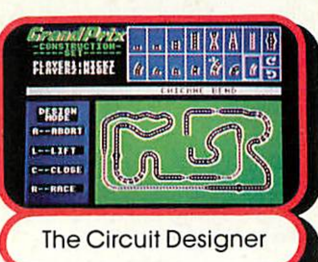
# GRAND PRIX
## CONSTRUCTION SET

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Brands Hatch | Silverstone | Mallory Park | Oulton Park | Castlecombe | Snetterton | Thruxton | Donnington | Monza |
| Monaco | Kyalami | Zandvoort | Nurburgring | Paul Ricard | Imola | Long Beach | Zolder | Estoril |




## Drive into a New Dimension

Grand Prix Construction Set is a motor-racing game with a difference: it allows you to design your own race circuits — using straights, fast bends, sharp bends, chicanes and hump back bridges. Or you can select one of the many pre-defined race tracks, which include most of the world's famous Grand Prix venues. Then race against another player, or against the computer — there are 5 skill levels to choose from.


The Circuit Designer


On the First Lap

### Features of the Game

- Easy-to-Use, Icon-Driven Circuit Designer
- Save and Load your own Track Designs
- 18 Pre-Defined Grand Prix Race Circuits
- 1-Player and 2-Player Options
- Spectacular Split-Screen View of the Race
- Dramatic Skids and Crashes

| | |
|---|---|
| BBC Micro cassette | £9.95 |
| BBC Micro 5¼" disc | £11.95 |
| BBC Master Compact 3½" disc | £14.95 |

Grand Prix Construction Set is compatible with the BBC B, B+ and Master Series computers.







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